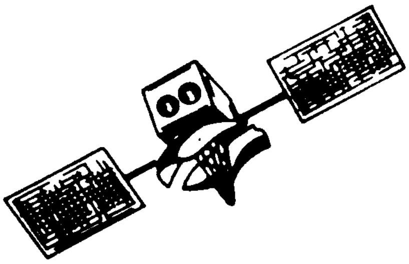

COOP'S SATELLITE BUSINESS OPPORTUNITY MANUAL

SO YOU THINK you want to get into the business of selling and installing home (private) satellite TV terminals? This Bob Cooper Manual tells you what to watch out for, and how to make it in this tough, new business enterprise area. You may even decide to pass this one up!

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P. O. Box G
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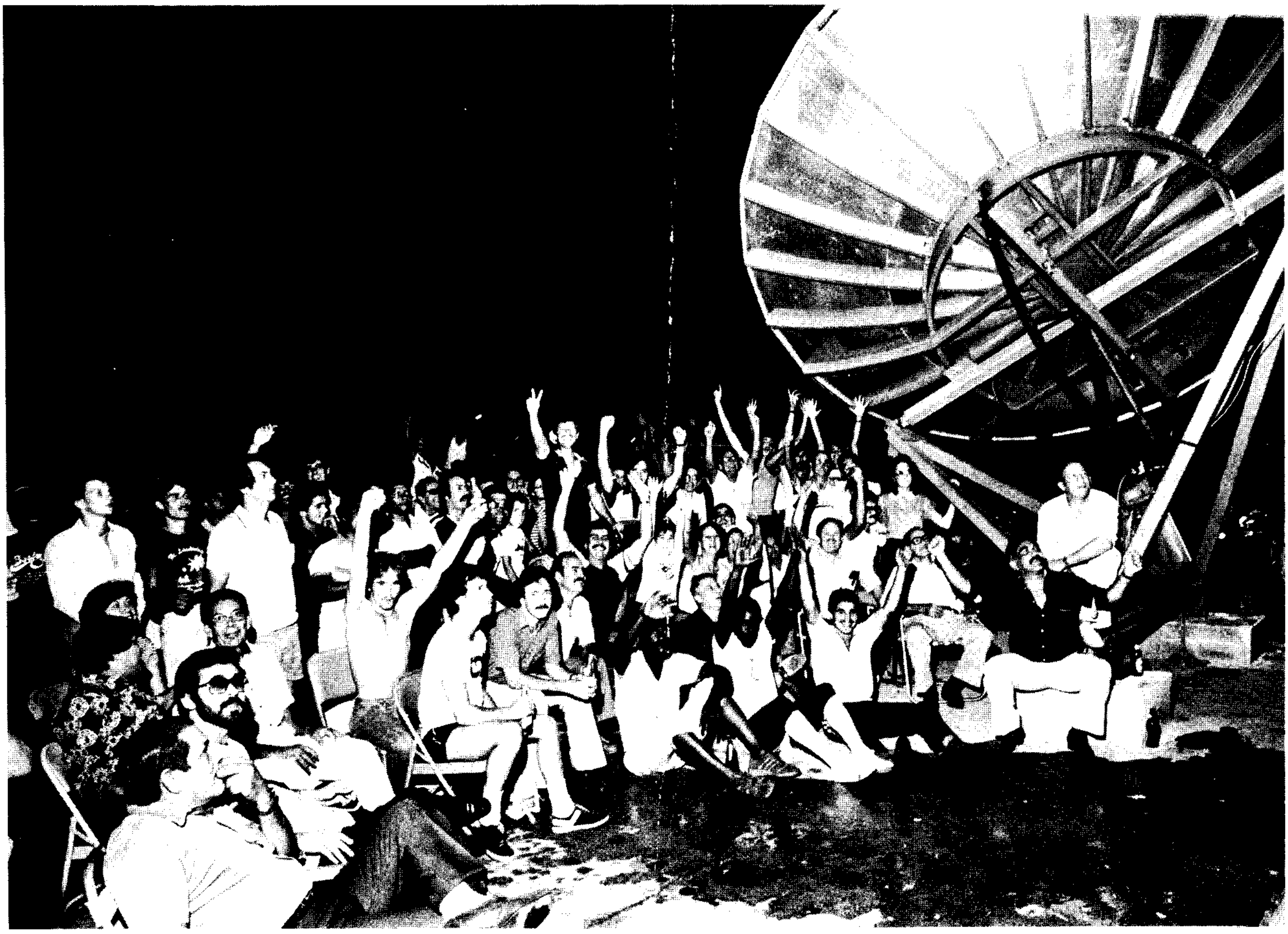
PRICE: $50 per copy



DRAWS A BIG CROWD - when you have a special event to show-off reception, such as a championship fight, you can expect to get a lot of local free publicity and a big crowd.

COOP'S SATELLITE BUSINESS OPPORTUNITY MANUAL

Here it is...the inside story of all of those products now appearing in the satellite field and what you need to know to make them work for you as a 'packaged system' which you can sell as a dealer in your area. Frank, honest, down to earth.

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THE COVER - He started it all. With an article written for **TV GUIDE** in mid-1978 Bob Cooper dared to tell the world that he had a private, at-home satellite TV terminal. Thousands responded. Dozens of magazine articles later and numerous appearances on national television behind him Coop and his family are now living in the Turks and Caicos Islands in the Caribbean where they are building for that nation the first 'national television service'. YES - satellites are involved. He still operates STT from Oklahoma and creates **CSD** each month; only now he does so from a beachfront location where it never snows in the winter and there are no tornados in the spring/summer!

THIS MANUAL has been produced and is being distributed by Satellite Television Technology, with editorial offices at Grace Bay, Providenciales, Turks and Caicos Isles in the West Indies. Business offices are located at (STT) P. O. Box G, Arcadia, Oklahoma 73007; (405/396-2574). You can call the business office and talk with Rick Schneringer most anytime. Getting ahold of Coop on the telephone is another matter...

COPYING THIS MANUAL - If you are bound and determined to copy this manual with your office copying machine or by long hand or in braille we suspect nothing we say to you will deter you. On the other hand Coop has spent several hours writing this manual while laying out on the white, sandy beach of Provo sipping lemonade (believe it!), watching the lazy seagulls circle in the sky and generally trying to stay out of the way of the surfers and sand crabs and he figures he is entitled to just compensation for his efforts. So just for the record this Manual is copyrighted 1980 by Satellite Television Technology and Bob Cooper in both the good ole' US of A as well as in the British Empire through the British Commonwealth Treaties Act. All rights (whatever they are worth) are reserved. In other words if you don't copy it without our permission (which we won't give so don't ask) you won't have any difficulties with the US feds or the British bobbies. Copy it and Coop will send a first wave of seagulls to bomb your house followed by a second wave of surfers slinging their surf-board torpedoes ending up with a massive attack of sand crabs.

CONTACTING STT - We want to hear from you. You can write to Coop at the STT office address in Oklahoma or you can talk with Rick Schneringer who likes to talk on the telephone at most any hour of the day or night. If you are not a subscriber to **CSD** (Coop's Satellite Digest) shame on you. There is no way you can keep up with the fast-paced changes going on in this funny little industry unless you have a first class copy (that's the only way we mail them) of **CSD** each and every month. STT also sponsors the SPTS/SBOC gatherings three times per year at which you have the opportunity to visit with dozens of equipment suppliers (including most of those mentioned in this manual - if they are still in business) and chase Coop around the floor asking him crazy questions about equipment and services. There is no good way (on purpose) to contact Coop directly; believe us. BUT - if you write to him in care of STT Rick Schneringer will see that he gets your correspondence through the weekly air shipment of goodies going down to Provo from Oklahoma. If you happen to be a ham radio operator you might find either Coop (VP5D or VP5DX) or Susan (VP5DYL) on some ham band from time to time. To get their attention the 'secret pass word' is 'Satellite'. That will cull you out of the pile-up in a hurry. **Peace.**

EVALUATING THE OPPORTUNITY

Virtually everyone touched by the satellite revolution grasps the concept that something significant **is happening** here. The aim of this manual is to separate the hypothesis from the fact and 'grade' the participants in this revolution by their to-date demonstrated ability to be a part of the evolution of communications.

Satellites **are** exotic, esoteric and mind boggling. We have during the past decade become acquainted with the general concept of satellites because they have come to be a part of our daily lives. However unlike many past technological breakthroughs the satellite **combines** 'state-of-the-art' technology in numerous areas, both electronic and mechanical and for an individual to grasp the inner most secrets of the system requires more than specialized technology knowledge in a single area.

Still, the basic operating parameters of the satellite system are easily understood even by primary grade students since **the system itself** is not complicated; only the implementation of the system remains mysterious. This then gives us the best of many worlds; a 'system' understood by virtually anyone who cares to study it for 30 minutes or so and an operating configuration only implemented by reasonably skilled practitioners of a series of new, exotic arts. Simply put...everyone can participate at the level they find most comfortable.

There is in virtually all avenues of life something known as **'The Peter Principle'** which simply stated is **"a person shall rise to his level of incompetency and there he** (or she) **shall stagnate..."**. The Peter Principle is nowhere more evident than in the satellite hardware field. Certain mechanical/electronic aspects of a satellite receiving system are understood and even 'home duplicated' by most anyone with a small workshop and steady hands. Other portions of the system are quasi-understood by the average person but seldom executed to peak efficiency in the home workshop. Still other portions of the system are little understood by most and never implemented in the home workshop to peak efficiency. The most important thing a new comer into this field can assimilate is to know when he has reached his own 'Peter Principle' level of competence.

To properly assess the wide range of opportunities available to you in the low-cost satellite revolution you must first understand the system itself. Only when you do comprehend what the sytem is and how it functions can you determine what portion of the system best suits your own background, talents and resources.

THE WHOLE SYSTEM

The satellite is a relay station; it reproduces at its "output" exactly what it receives at its "input". It is a microwave frequency range relay station launched in a protective container abroad a rocket into 'middle space'; that region far above the atmosphere of earth but not so far as to qualify as 'deep' space.

The satellite's container provides protection against the intense heat and shock of the rocket launch and layers of the container are 'shed' by the satellite as it is lifted higher and higher above earth in a complex set of manuevers following lift-off

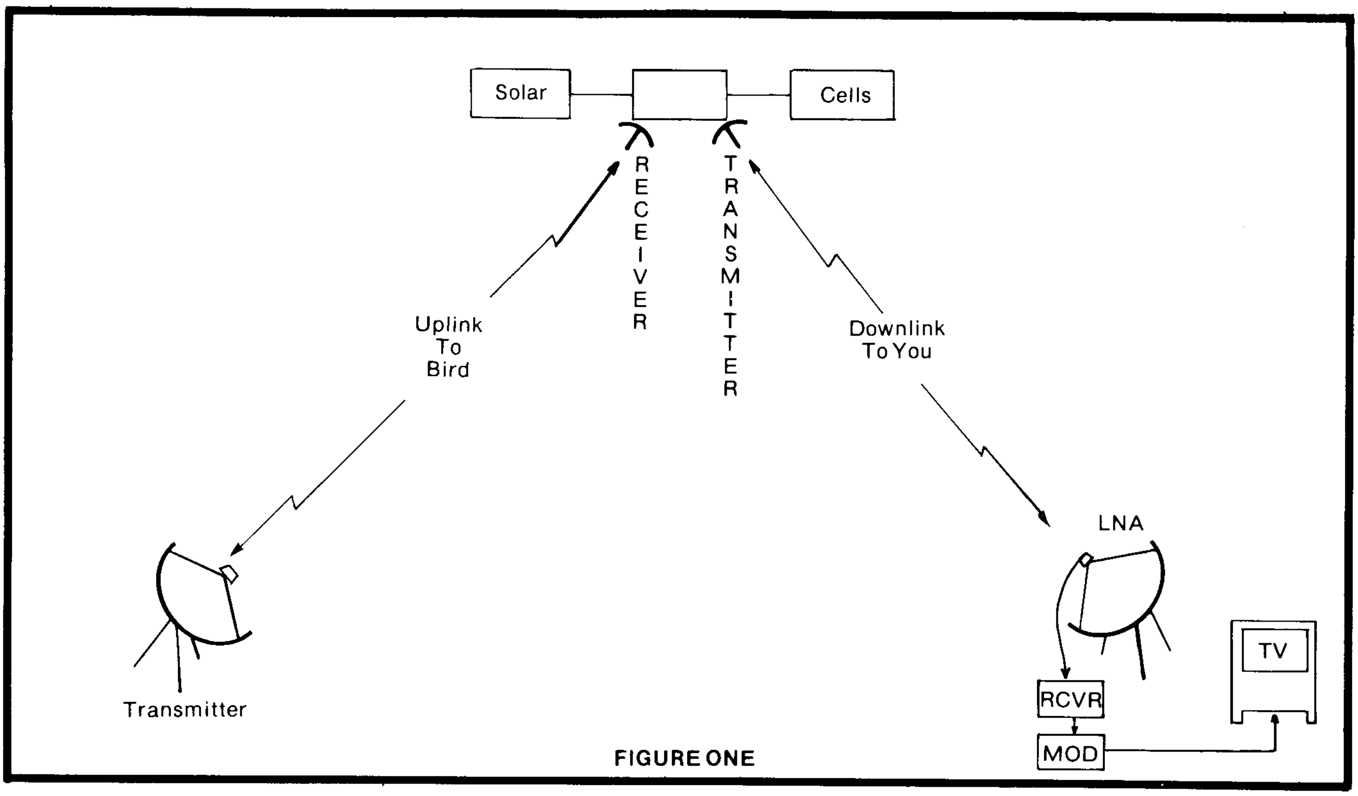


FIGURE ONE

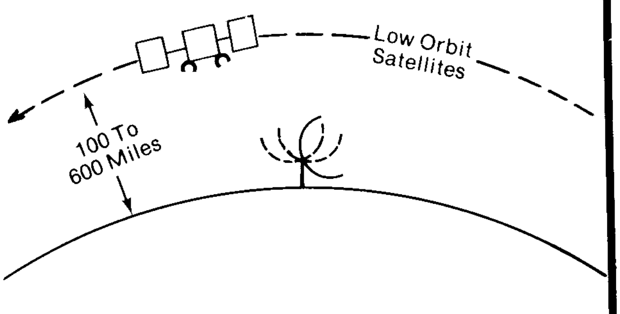

Low orbit satellites must be tracked or followed as they move across the sky.

FIGURE TWO

from the rocket pad. In its final form the satellite typically weighs between 600 pounds (the present family of WESTAR satellites) and 3,000 pounds (the reported weight of some Russian geostationary satelltes). And while there are several types of satellites in operation with many different types of 'trajectories' the one of particular interest to us here is the geostationary or **Clarke Orbit** family.

Arthur C. Clarke, science-fiction writer and underwater explorer conceived the geostationary system in 1945. Clarke postulated that if a rocket was to launch a communications satellite into middle space and if the satellite could be 'flown' or 'guided' into a flight path which was very nearly 22,300 miles **above** the earth and **directly over** the equator something very 'magical' would happen. That being that at that height above the equator the satellite would appear to 'hover' in space, **as if it were standing still**, above a spot on the ground which later came to be known as the 'sub-satellite' point.

Having a satellite 'appear to stand still', hovering in space in one spot, was a key element in the development of communication satellites. Satellites launched into space in a trajectory or path closer to earth must keep moving at a rapid speed or their weight will respond to the pull of gravity and the satellite will come crashing back to earth. There are hundreds of these 'low orbit' satellites in operation or in the satellite history books and for their particular applications (such as relatively-low-level surveillance of the earth) they serve a valuable purpose. But for our purposes, sending messages in some form into space to be received by a relay station and then relayed back to earth, the geostationary satellite is the right answer.

Why? Well, if we attempt to relay messages through a **low-orbiting** satellite the station transmitting to the 'bird' and the station(s) receiving from the bird must constantly track or follow the satellite through the sky since the satellite is moving. This immediately requires substantial antenna tracking systems be added to the system. But more important than the additional cost is the additional complexity of the system. Low orbit satellites are only 'in view' or useable from a specific location for a short period each day. For any type of service that requires full-time communications, the low orbit satellite is not a satisfactory system.

Geostationary satellites provide a quantum leap forward in both technology and opportunity. From its 22,300 miles elevation above the equator the geostationary satellite has a view to approximately **40%** of the earth's surface. Three geostationary satelliets, spaced every 120 degrees around the earth, can cover virtually all of the inhabited land mass areas of the world. Visionary Clarke suggested that **all** of the world's communication needs (message traffic, telephone conversations and television) could be served by three such satellite systems.

Some of the satellite systems in the world desire to reach or transmit and receive from this ''40%-earth-coverage-view'' region. INTELSAT, the consortium of nations who have banded together to fund and operate the world's large geostationary satellite communications system, operate primarily on this premise. Other satellite operators have less ambitious coverage require-

Geostationary Satellites and Earth Move at Same Speed; i.e. Geo Synchronous

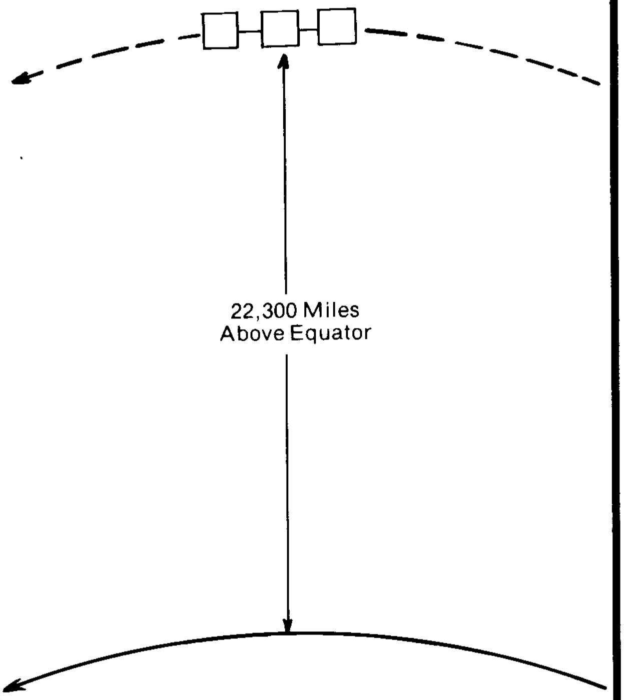


FIGURE THREE

ments however. As an example, the Canadian ANIK series of satellite only wish to provide coverage to Canada. And while they are located above the equator at 22,300 miles just like INTELSAT birds **and could in fact** transmit material to virtually all of North and South America **combined** they elect to cover only Canada. ANIK does this by installing on board the satellite special 'directional' transmitting and receiving antennas; antenna systems that only 'see' transmissions coming to the satellite from Canada and only transmit material back to Canada.

The United States family of satellites operate with a similar principle, modified somewhat from ANIK by the geographic extent of US interests. US satellites are typically designed to provide coverage to Alaska and Hawaii as well as Puerto Rico and the (US) Virgin Islands; in addition to the continental 48 states (called CONUS). Satellite designers have created receiving and transmitting antennas for the US satellites which primarily cover Alaska to Puerto Rico (along a northwest by southeast line) and which have secondary (so-called 'spot beam') coverage to Hawaii.

NOW Canada is a well defined singular land mass. It is approximately rectangular, and satellite antenna system designers like that type of shape; it is fairly easy to 'illuminate' with receiving and transmitting antennas on board the satellite. The Alaska/Puerto Rico/CONUS situation is more complex. In between Alaska and CONUS is a substantial portion of Canada while in between Florida and Puerto Rico is a fair chunk of Caribbean. Since the satellite antennas cannot be designed to 'turn on' certain well defined areas (Alaska for example) and turn off on immediately adjacent areas (Canada for example) there is satellite signal 'spill over' from the US satellites into Canada. To a lesser extent there is similar 'spill over' in the Caribbean between Florida and Puerto Rico.

The truth of the real world is that each satellite has something called 'boresight'; **a point on the ground** where the satellite's transmitting and receiving antennas are most directed. This is less of a well defined 'point' than it is a general 'area' (typically several states square) however. And typically 'boresight' (the area where the signals from the satellite are strongest as received on the ground) is located in the middle of the United States in the Iowa/Nebraska/Kansas/Missouri region.

Canadian satellites have a boresight in the middle of **that** country but centered (north and south) 'low' in the country close to the US border; because this is where the majority of Canadians live. It should be no surprise then that Canadian satellite signals are received well into the northern 1/3 to 1/2 of the US.

The key item to keep in mind is that satellites can provide either something called 'Global Beam' coverage (transmitting and receiving to and from that 40% of the world they can 'see' from their geostationary location), or, by design they can cover only a portion of the earth below.

Example of Specialized Signal Contours From Bird [Japanese BSE Experimental]

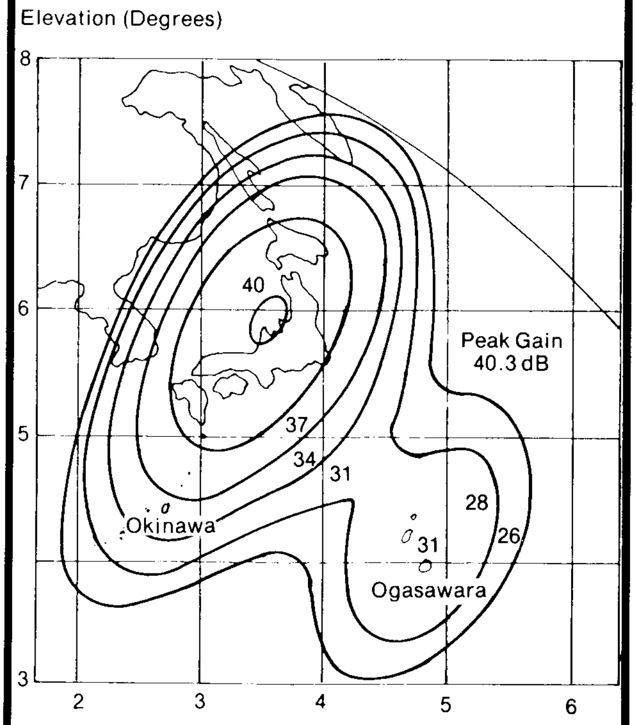


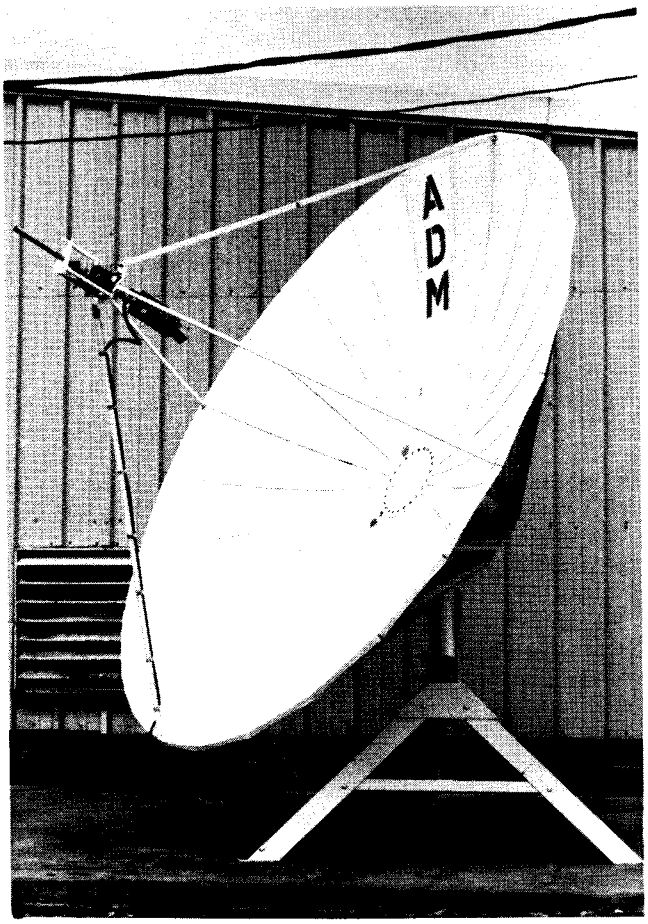
FIGURE FOUR

Generally speaking the transmitting power available in the satellite is quite low. This power level (typically between 5 and 10 watts per TV channel) must be 'spread' like a film of water over that portion of the earth the satellite antennas are designed to cover. When the satellite operates to cover only a portion of the earth below the 'film' **of signal** is 'deeper' than it would be if the satellite had to spread the available power over 40% of the earth. The principle is just like having a container of water of finite quantity. If you spread 1 quart of water over a concrete pad 2 foot by 2 foot you would have a specific 'depth' of water. If the same quart had to be spread over a concrete pad 10 feet by 10 feet, the depth of the water over the pad area would be shallower. In our analogy the depth of the water is the same as the strength of the satellite signal.

THE RECEIVING SYSTEM

The satellite signal is received on earth by a special type of antenna which experience has shown is best for this type of service. The antenna is a geometric shape called a parabola; it resembles a shallow dish and is often so called.

In many areas of the world today drinking and bathing water is caught from the sky (when it rains) and stored. In such regions the roof on the house is a capture area for the rain water; down spouts connected to the guttering around the edges of the roof carry the rain water to a holding tank called a cistern. We have another analogy here. Since rainfall is quite even (over small areas) you can increase the amount of rainfall caught (and subsequently stored) by having a larger **roof** area. The same principle applies to the surface area of the satellite parabola. The larger the antenna (surface area) the more satellite signal caught. In our satellite system the antenna dish surface is metal or metalized material. The signals from the satellite(s) bounce or reflect from metalized surfaces. The precise parabolic shape of the dish causes all of the signal intercepted by the dish surface to reflect from that surface to a specific (well defined) '**focus point**' at the **center** of the antenna.

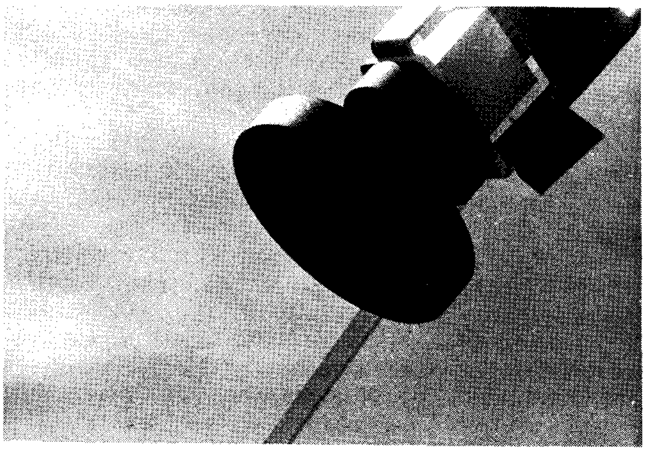


TYPICAL HOME TERMINAL ANTENNA- ADM 11 foot model is assembled from 24 separate panel sections and base must be secured to firm foundation to keep antenna 'stable' and pointing in the right direction at all times. Assembly time-approximately ten hours.

The satellite receiving system includes a small 'pick up' antenna which is positioned at that 'focus point'. Energy intercepted by the dish, from the satellite, is reflected to the focus point and here it is gathered up by the focus point antenna device; called a 'feed'. The feed in turn is directly connected to a signal amplifying device called (in the trade) an LNA. This Low Noise Amplifier boosts or amplifies the satellite signal right at the antenna and sends the amplified signal inside to the receiver proper through a special 'low-loss' cable.

Let's stop here for a minute and review the basic parameters of the dish antenna, the feed pick-up antenna and the LNA.

1) **Dish antenna** - The larger the dish antenna, the greater its surface 'interception' area. Therefore larger antennas intercept more signal than smaller antennas and the least complicated way of increasing your receiving system signal quality is to install a **larger** receiving antenna.
2) **Feed** - The feed is designed to 'see' just the surface of the dish antenna. It collects the satellite signal energy and mates or connects it to the LNA unit. In most (commercial) systems the feed bolts directly to the LNA; a hole or opening (of precise dimensions) at the **rear-of the feed** matches a similar hole or opening on the **front of the LNA**. Signals collected by the feed (antenna) flow into the LNA directly.
3) **LNA** - The low noise amplifier is the most 'exciting' part of the satellite receiving system primarily because the technology for it did not exist as recently as 1975. Prior to the development of the LNA device all satellite terminals were of a commercial nature and each utilized one or more 'parametric amplifiers' in place of what we know today as the LNA. In 1975 a parametric amplifier cost upwards of $20,000 and $50,000 per was not uncommon. The development of the LNA was a major technology breakthrough even though by today's standards the early LNA units were still quite expensive; upwards of $7,000. The LNA depends upon something called a GaAs-FET which stands for Gallium-Arsenide Field Effect Transistor. The GaAs-FET is a very special transistor, almost hand made in the early days, capable of amplifying the very weak satellite signals without adding noise to the already weak signals. As recently as early 1979 a single GaAs-FET transistor cost the LNA manufacturer in excess of $300 each and LNAs use two or three such devices. With the rapidly expanding marketplace GaAs-FET manu-



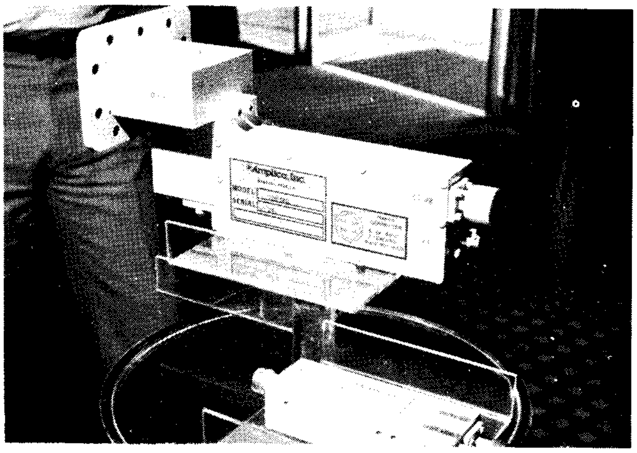
FEED is actually small sub-antenna that mounts in front of dish surface at precise focal point. It bolts directly to low noise amplifier [LNA] which also mounts at focus point.

facturing techniques have improved rapidly so that today devices that cost $300 in 1979 cost under $25 each. The future? Probably $10 GaAs-FETs within 12 to 18 months and with each price drop comes improved technology.

The LNA can be 'graded' just as the antenna can be 'sized', for performance. LNAs are promoted with various 'noise temperatures' and 'gain values'. Noise temperature is an engineering measurement technique wherein the overall noise contribution by the LNA is quantified. **A perfect LNA** would have **no noise** contribution at all; it would be a 'no-noise' unit. Therefore an LNA with a '**lower** noise temperature' is a more desireable unit than one with a 'higher noise temperature'. Gain value is a simply a way of determining how much the satellite signal is boosted or increased by the low noise amplifier. Seemingly more gain would be better than less gain but this is not always the case. In engineering any satellite receiving system there is an optimum value of gain for the LNA and an optimum corresponding value of gain for the receiver proper. **It is possible to have too much gain in the LNA** and actually make the satellite reception worse; a subject we'll look at in some detail later in this manual.

Several years ago the 'standard' LNA had a 250 degree noise figure and a 50 dB of gain. As technology improved the noise figure dropped and today the 'standard' is 120 degrees while lower noise units (100 degrees and even 85 degrees) are coming along fast. With each drop in noise temperature (lower noise temperature number) the system has additional sensitivity and better looking pictures.

As noted the LNA 'amplified' signal is carried to the receiver proper through a piece of coaxial cable. Coax, as it is known, is round, typically upwards of 3/8ths of an inch in diameter and is expensive by normal cable standards. All cable has 'loss'; that is, all cable will lose **some** signal power as a function of its length; if the cable length from the LNA to the receiver is short (say under 50 feet) a common coaxial cable called RG-8/U can be employed. For longer runs (50 to 125 feet or so) a better quality (lower loss) cable such as RG-217 is used. For even longer runs a stout cable that does not flex (i.e. bend or twist), known as Heliax, is used. Cable loss between the LNA and the receiver proper is expected but must be controlled by the system designer. Loss can be tolerated if it is planned for, since the LNA can be selected with slightly more signal gain when the cable losses will be substantial.



LNA or low noise amplifier is weatherproof unit connected directly to feed antenna system. It must have operating power (requires separate cable from inside or can be fed power through coaxial cable with some models) **which it obtains either from home receiver or separate power supply unit.**

The inside 'end' of the coaxial cable connects to the satellite receiver(s). The first satellite TV receivers were very expensive ($7,500 as recently as 1978) and were in fact designed for complex INTELSAT installations where cost was less of a factor than 100% long term reliability. Starting in 1977 several of the receiver suppliers then selling equipment to the cable TV industry for its satellite terminals began to develop special receivers with features that were desireable for cable systems. By 1978 some of these receivers were down around the $4,000 region. At about that point in time several creative private experimenters began designing even simpler receivers. Stanford University Professor Taylor Howard and English BBC engineer Steve Birkill were among the first to produce receiver circuits which could be assembled by **home** builders for **less than $1,000**. It was the pioneering work of both of these individuals and others that came later which led to the development of the present low-cost or private (as in 'home') satellite TV receiving systems. We'll look at receivers in considerable detail later in this manual.

The receiver is not like a normal TV receiver since it does not have a speaker (for sound) or a picture tube (to display the video). In many ways it could be considered a 'converter'. The signal from the dish antenna and the LNA is plugged into its 'input'. Plugs or jacks on the back of the 'satellite receiver' (converter) plug into one or more TV receivers which are used to display the picture and sound. All of the normal controls on the TV receiver are bypassed (with the exception of the on-off switch) with the more complex satellite receivers. These receivers have their own controls to adjust or change 'channels', to adjust the sound and so on.

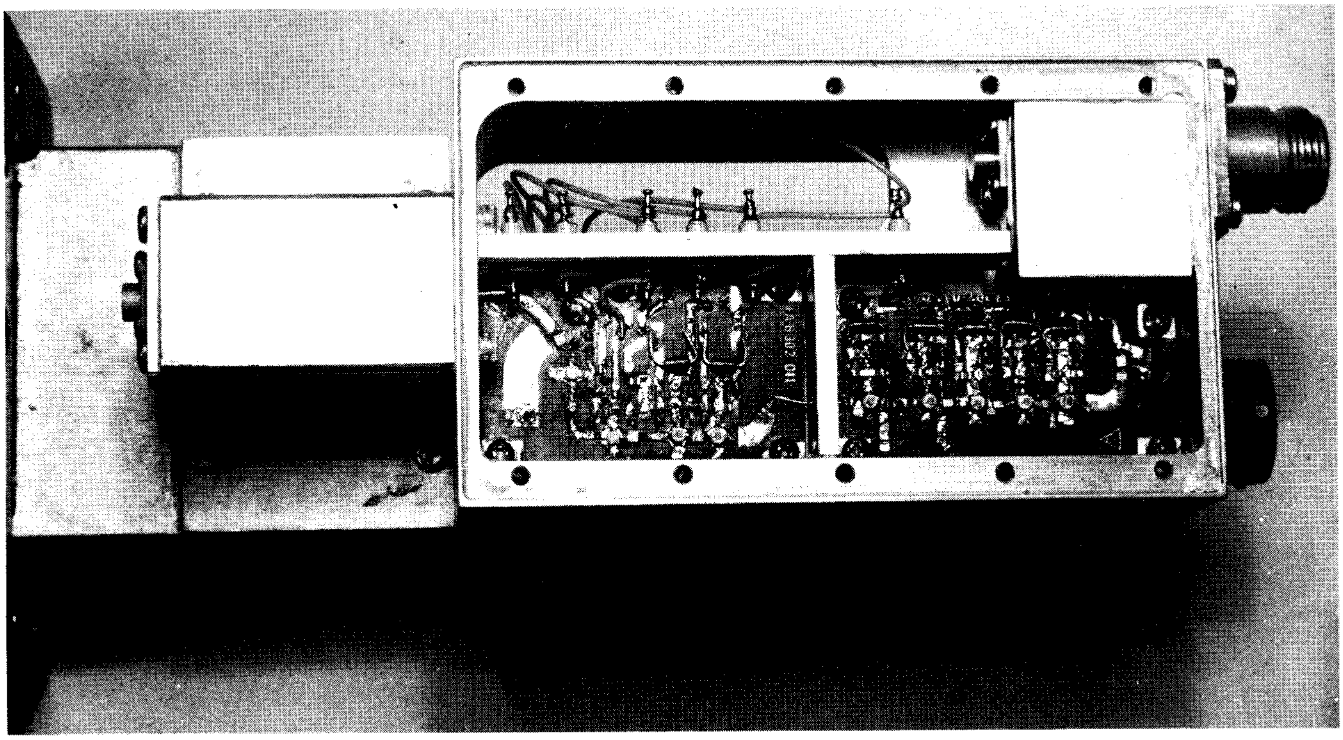
The satellite TV receivers all do one thing in common; they receive the 'microwave frequency signals' from the satellite and 'convert' these signals into picture and sound which the normal TV receiver can display. Beyond that receivers vary widely. Many of the home satellite receivers can be connected directly to a standard home TV receiver; the satellite receiver has built into its circuits a small device called a 'modulator' which translates the raw picture (video) and sound (audio) into a TV channel format. To an engineer a modulator is a very simple, very-low-power TV transmitter. If you own a video tape recorder (VCR) you have a 'modulator' built in there also. Each modulator has a 'standard' TV channel operating frequency or format; if your satellite receiver has a modulator built-in you check to see what channel this modulator operates on, and then set the TV receiver to that channel. A simple small coaxial cable (RG-59/U type) connects the satellite TV receiver modulator 'output' to the TV set 'input'.

Other satellite TV receivers do not have a built-in modulator and to make the satellite receiver 'play' into your TV receiver you must have an outboard or separate 'modulator' device. In this case the output of your satellite TV receiver is in two jacks; one marked audio and the second marked video. The separate modulator has two companion jacks built in and you connect the **satellite video output** to the **modulator video input**. The audio is done in the same way. Then on the modulator you will find an 'RF' output. You connect **this** output jack to the receiver and tune the TV set to the channel which corresponds to the modulator channel.

HOW SERVICES DIFFER

Unfortunately for those who would like everything kept simple, the satellite transmission service utilizes a number of different 'transmission formats'. This means that if a home satellite terminal is going to be equipped to receive **all** of the TV transmissions the receiver proper must have some special circuits built-in to receive these varying formats.

1)**Vertical and Horizontal** - The earliest satellites for the US and Canada were capable of relaying **up to 12** separate TV channels. Shortly after ANIK and WESTAR (the earliest North American satellites) were operating RCA announced a new system wherein **24** different TV channels could be carried by a single satellite. RCA accomplished this feat by using the same microwave frequency band twice. On each RCA

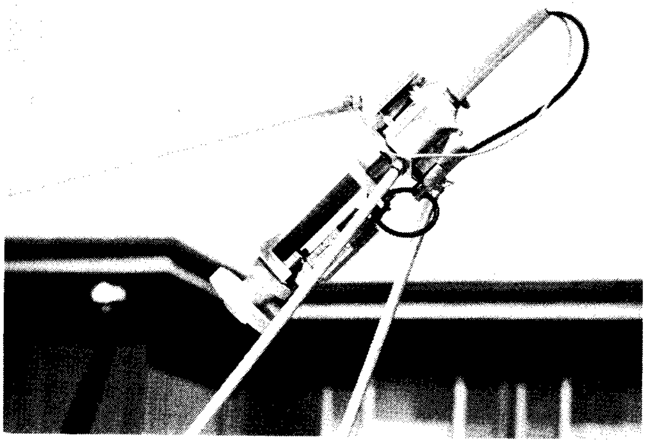


INSIDE OF LNA is very carefully selected set of high tolerance parts adjusted to within 1/1000th of an inch tolerances for maximum amplifier performance.

satellite 12 channels are transmitted in something called '**horizontal polarization**' while 12 more are transmitted in something called '**vertical polarization**'.

The RCA system has subsequently become the standard system and while there are still many 12 channel satellites still operating as they retire they are being replaced with 24 channel birds.

On the ground your feed antenna, sitting out at the focus point for the dish antenna, has a 'sense of polarization'. One of the many adjustments you make when you install the terminal initially is to 'align' **the feed antenna sense of polarization** to match the signals from the satellite. If you are initially receiving signals from any of the ANIK or WESTAR satellites, and you adjust your feed antenna for maximum signal, you will be receiving (and matched to) a horizontally polarized signal. Then if you move your parabolic antenna to receive an RCA satellite or one of the COMSTAR satellites, you will still be receiving horizontally polarized signals. BUT - you will only be receiving **half** of the channels on the RCA or COMSTAR satellites. If you then flip or move your feedpoint antenna so it turns on its axis by 90 degrees you will 'lose' all of the horizontally polarized channels and receive a whole **new set** of channels in the vertical polarization.



POLARIZATION ROTATOR allows armchair adjustment from inside. Rotor turns only LNA plus feed antenna between vertical and horizontally polarized signals.

This then adds a new receiving system control element; **the selection** of either vertical **or** horizontal polarized signals. Most private (home) terminals accomplish this by installing a small motor driven system behind the feed antenna. From a switch located at or built into the receiver the motor turns the feed antenna from horizontal to vertical (or back again). Keep in mind the 'big' dish is not moving; just the 'small' feed or focus point antenna. It is not moving as much as it is turning on its own axis.

There is another way to do the same thing. Commercial installations install a special device at the feed antenna called an ortho-mode transducer. The OMT **separates** the vertical and horizontal signals into **two paths** at the antenna. The installation then requires **two** (twin) LNA units; one for the vertical signals and one for the horizontal signals. And **two** coax transmission lines, one for each polarization of signals. AND - **two** receivers, one for each polarization of signals. The advantage of this system is that the installation can **simultaneously receive both** vertical and horizontal signals from an RCA or COMSTAR satellite. The dis-advantage is that twice the amount of equipment is required; from LNA on back to the receiver.

The most cost effective approach for most home users is the simpler 'feed rotation system' and most installations utilize a common ($25/$30) TV antenna rotator to turn the feed or focus point antenna for this function. At least two of the commercial receivers available have mated this vertical/horizontal function with the receiver control or tuning system so that the horizontal/vertical switching motor comes on automatically to switch the antenna feed to the proper position as the receiver is itself switched from channel to channel.

2) **Various Audio Formats** - The sound in a satellite transmission is carried along with the picture on something called a sub-carrier. This is a system which tacks or adds the sound to the picture so the sound kind of rides along as a hitch hiker. The sound sub-carrier has a specific operating frequency within the TV signal. In most instances the sound sub-carrier is located at 6.8 MHz (megahertz). Since the satellite receiver's sound portion **must be tuned into** the proper sound sub-carrier frequency (either manually or at the factory) we have to have some way to set that frequency to match the satellite's transmission parameters. The sound sub-carriers can, in theory, be placed anyplace from 5.5 MHz to around 7.5 MHz; 6.8 being slightly above the 'middle' of this frequency range. And while most of the RCA satellites do utilize this 6.8 MHz sub-carrier frequency, COMSTAR and WESTAR often use different sub-carrier frequencies. PBS transmissions on WESTAR I, for example, are on a sub-carrier frequency of 6.2 MHz.

This then says that a receiver must be equipped with a switch or a tuning knob which makes it possible for the receiver user to select the appropriate sound sub-carrier frequency to match the transmission. Virtually all receivers now available include a pair of sub-carrier frequencies; 6.2 and 6.8 MHz. They are typically switch selected although some receivers have separate output jacks on the rear panel for the two most-used sub-carrier frequencies.

None of this addresses the special circumstances presented by the international transmissions from non-North American satellites (i.e. INTELSAT or GHORIZONT). Detailed explanations of the special operating circumstances presented by these satellites is found in **Coop's Satellite Operations Manual**, available from STT.

BECOMING A DEALER

Perhaps on the surface the least complicated way of entering the home satellite business is to become a dealer in equipment. A person can become a dealer by simply making arrangements with suitable equipment suppliers to buy and then re-sell their equipment in an area of the country.

Yup - that sounds simple enough. But of course it is far more complex than that, as we shall see. The first thing any would-be dealer/seller in satellite hardware must do is acquaint himself with the basic ingredients of the system itself and plan his own installation. YES - that says that **before** you can sell one you need to have one installed on your own to really learn the ropes of this business.

This is a high technology business. The equipment you will be installing is about as advanced as anything in electronics today. It may not be as **complex** as say a digital telephone system but it is just as developed in its own way as anything else going right now. Furthermore the 'state-of-the-art' (defined as the present stage of development of the science and engineering) is changing monthly if indeed not weekly. As we shall see, it's that **constantly advancing** 'state-of-the-art' that harbors one of the biggest pitfalls for the neophyte businessman in this field today.

If you do decide to get into this business to sell private (home or commercial) terminals to people or businesses in your area, your own first terminal (probably installed at your own home) will become your first showpiece system. Now when you start out in this field you are naturally not **totally** convinced that it **will work** for you. There is always that lingering doubt that perhaps - just perhaps - it may not work in 'your' area. And this fear that it might not work is going to cause you to be cautious about what equipment you buy and how much money you spend to begin with. There is a natural tendency on the part of many to 'do it cheap' the first time because you fear that if it does not work you will not have 'wasted' money on a project that did not turn out.

Let's deal with it not working:

1)If you are located anyplace within the CONUS area or Canada south of say the 60th parallel **there is no way that it cannot work** because you don't have a signal available. That is, if it doesn't work, you have a problem unrelated to the satellite coverage area itself; a problem which you should be able to handle 'on the ground'.

a)BUT - there is this warning. The ten foot antenna that works fine in Kansas will **not** work satisfactorily in Maine or south Florida. You must have the common sense to select an antenna with sufficient capture area to make up for whatever distance you are removed from the 'boresight' of the satellite. We will look at this shortly.

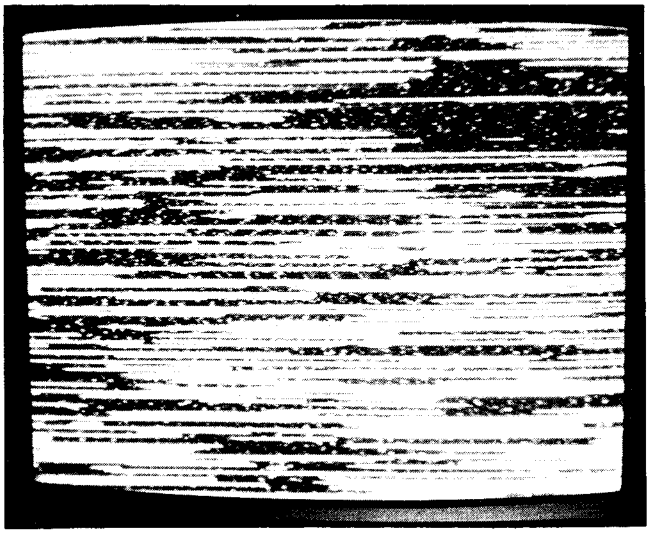
2)**Now to ground problems.** One ground problem to be considered is the 'look angle'. That's the angle **above** your horizon which the satellite signal arrives from. The further south you go and the further west you go, the higher FI 'rises' in the sky. An antenna in southern California looks upward to the southwest (for FI) nearly 70 degrees. An antenna in Maine looks up only a short distance above the horizon; around 8 degrees. The trick here is to select a spot in the yard or on the property where your FI (or whatever bird) look angle from the ground will be 'clear'. If your look angle is 15 degrees (above the horizon) and you have a row of trees (or a hill or tall building) in the direction of the satellite rising 20 degrees above your 'horizon' line, **then you do have a problem**. There will be **some** locations where you cannot put in a parabolic antenna and 'see' all (or any) satellites.

This suggests you will have to develop a 'sixth sense' for elevations and 'look angles' in your area knowing as you pull up to a potential location whether there is going to be a problem there, or not. It is basic to satellite reception that the **view** from the dish to the sky (and the satellite) must be 'clear'; that means unobstructed.

3)Here is another ground problem; **interference**. Satellites 'share' their downlink (satellite to earth) frequency band with a terrestrial microwave service operated by telephone companies. Inter-city telephone connections plus inter-city network TV is carried from microwave relay to microwave relay station in the same 3.7 to 4.2 GHz (gigahertz) band.

In metropolitan and urban areas perhaps 10% of all locations randomly chosen for satellite reception **will have** some amount of terrestrial interference. In rural areas this drops to under 2% of all locations. Terrestrial interferance **varies** from totally ruining satellite reception on **all** channels for **all** satellites to causing slight extra 'noise' in the picture on perhaps a single channel. Microwave signals are funny things; sometimes you can shift the position of the satellite antenna on the ground **only a couple of inches** and totally eliminate terrestrial interferance; in other cases you have to dig a pit in the ground and install the satellite antenna **down inside of the pit** to place it below the surface level where the microwave signals are located.

About 50% of terrestrial interference can be eliminated inexpensively (shifting the receiving antenna slightly on the property, putting it behind a building which acts as a shield to protect it from terrestrial microwave signals). The balance can cost as much to cure as the whole antenna system costs. A small percentage cannot be eliminated for any reasonable amount of money.



INTERFERENCE from terrestrial transmitters takes many 'eyeball' forms. It may simply add black and white 'sparklies' to picture or it may consist of diagonal lines through picture.

One of the most effective ways of determining the nature and extent of your potential interference is to bring in a trailer mounted satellite antenna to the proposed site. In most trailer rigs today you can be set up and have reception in 30 to 60 minutes time from driving onto the site. A 'demonstration trailer rig' operated by a distributor or dealer is therefore useful for more than showing off the service; it becomes a form of test instrument. Another method of determining potential interference is to spend approximately $100 to COMPUCON (214-233-4380)for a paper 'Go/No Go Survey'. In this instance you provide the geographic coordinates (longitude and latitude of the proposed satellite receiving site) to COMPUCON and they plug the numbers into a complex computer program loaded with all of the data on existing terrestrial transmitter sites. COMPUCON then advises you whether the site is likely to have interference. This warning however; computer studies are not iron clad guarantees of anything. They tend to be pessimistic looks at potential interference and as many hundreds have found out a computer survey that warns you **NOT** to put a terminal at a specific location will very often turn out to be a location where no real-world interference exists. For a higher fee the same company will provide a computer generated map that will show what parts of a town (city, county) will most likely have interference. Such a map, many dealers have found, tells them going in where they can concentrate sales efforts since the 'interference-free-zones' standout on the map.

Are there any other reasons why a terminal might not work? None other than equipment failure or improper installation. Both are quasi-technical subjects covered in depth in **Coop's Satellite Operations Manual** from STT and will not be dealt with here.

The point here is not how to avoid problems but to anticipate that if there are problems **they can usually be resolved**. Remember this...the satellite's coverage is universal. The same programs rain down on Tacoma as Key West and all points between. If you can 'see' the satellite with your antenna, you will have satellite reception. **It is just that simple and foolproof!**

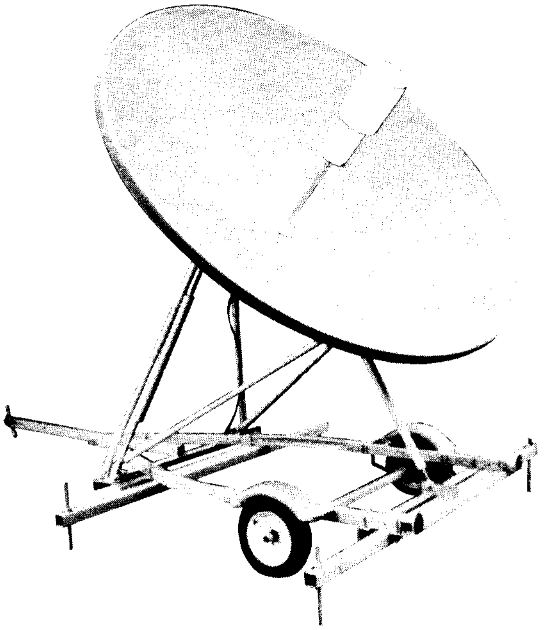
Let us now return to the matter of being a dealer.

We suggest that your first installation should be a **good** one. We urge you to not go the 'cheap route' with the first installation since ultimately it will end up being your basic demonstration system. Let's see where you might be tempted to shave a few hundred dollars off of the first system package price and what that may cost you.

1)**The antenna** - we now understand that antenna size is an important factor in system performance since more size equals more surface area and better signal capture area. There is a human reluctance to make the antenna any bigger than you think you can squeeze by with. We know from thousands of installations already in and operating that between roughly the Rockies on the west and the Appalachians on the east you can **get by** very nicely with a ten foot size dish; except south of a line from Atlanta to Los Angeles, where a 12 footer is more adviseable. We also know that outside of this region, with the exception of far southern Texas, most of Florida and New England you can get high quality pictures with a 12 footer; a 14 or 15 footer recommended in those extra-extra fringe areas.

However on the chance that you will be showing off your installation possibly with a big-screen (projection) TV and you want it to look exceedingly clear and sharp, **it is our recommendation** that you upgrade with the first installation one antenna step. Use a 12 foot in the center, a 14 foot or 15 foot along the edges and a 16 footer in the far edges.

Next comes the matter of how you show off your reception and what you want to impress your potential customers with. Under the present satellite use gameplan we have around 20 television channels operating near full time or full time on SATCOM FI (the RCA satellite at 135 degrees west), another pair on WESTAR II (123.5 degrees west), three from Canada on ANIK B (109



TRAILER MOUNTED rig is important sales tool but should not be substitute for high quality permanent installation for home-demo purposes.

degrees west; useable in the northern portion of the USA), between 4 and 7 on WESTAR I (99 degrees west) as many as 11 on COMSTAR D2 (95 degrees west) and between 3 and 7 on WESTAR III (at 91 degrees west). Now in the early days of this business 99% of the users were happy 99% of the time by simply leaving their antenna fixed on SATCOM FI. This was (and is) after all 'the' satellite for cable TV and when you have movies and sports and news and religion and education and much more on 20 channels or so, you would think that most people would be content. Alas there are events of particular note where this satellite is not where the action is. An example if you please. Don King, the professional boxing promoter that brought you this fall's Ali/Holmes fight and the rematch between Leonard/Duran regularly arranges for this class of fight to be distributed to theaters all over the world for closed-circuit showing. The fight goes from the match location to those theaters via satellite. Such fights during the past year or so have been carried on as many as three separate satellites; each intended for a different market area. The recent Ali-Holmes fight, for example, was carried throughout Canada on ANIK-B; throughout the USA on a WESTAR satellite and into the Caribbean on something called COMSTAR D3. Furthermore as reported in the November 1980 issue of Coop's Satellite Digest (**CSD**) Don King now grants permission to private terminals to tune in these closed circuit fights provided no charge is made for viewing the fight.

An event such as this is a real attention getter. It is a natural opportunity for a satellite TV equipment dealer to show off his product to an excited, attentive audience. Alas, if you have a terminal fixed upon FI and it takes you several minutes (or hours) to readjust the terminal antenna to locate an event like this one you may well end up watching it on replay rather than live. This points up the need for having an antenna mounting system capable of being easily and precisely tracked from satellite to satellite. While this subject is discussed in great detail in STT's **Gibson Satellite Navigator Manual** it is also an important consideration for the would-be dealer.

''Can you get the closed circuit fights with this thing?'' the potential customer asks. ''Yes'' you reply ''and it is even legal to do so''. The sixty four dollar question. ''Can I come over to watch it?''.

Manual antenna adjustment is possible. It is not difficult...with some antennas. With others it is a long, tedious, oft-dangerous task. The best commercial answer is a motorized antenna system that allows you (or your customer) to track from satellite to satellite from the comfort of the easy chair. Just press a button and the antenna moves. With some of the newer mounts you can pre-program the location of up to say 12 satellites. You are watching FI and wish to move the antenna to WIII (WESTAR three). Simply dial up WIII on the selector switch and push the rotate button. The next picture you will lock up on will be on WESTAR III nearly half your sky-arc away!

In virtually every business there is a 'sell-up' sales approach. That simply means you start the customer off by qualifying what he wants and then you sell him to a higher dollar product or package. With satellite terminal customers **most of them want everything** that's up there in the sky. Some may later settle for lesser service based upon their financial means but in our business it is usually best to demonstrate the best system technology can offer and then let the customer seek his own comfort level of investment.

Motorized mounts? Only a few exist at the moment and they can typically be mated with virtually any parabolic antenna surface you select for your area. When you buy the parabolic surface from one outfit and the (motorized) mount from another you will have to do some advance planning with the mount company to insure that the mount will connect directly to the dish you have chosen. This means the first such system you package for your needs will require some careful checking and cross-checking between the mount manufacturer and the dish manufacturer so you won't end up with two separate, non-compatible pieces of hardware sitting in your yard.

Here is the limited selection of motorized mount manufacturers now in the field:

1) **AB Electronics**, 1783 W. 32nd Place, Hialeah, Florida 33012 (305/887-3203).
2) **Microwave General Corp.**, 2680 Bayshore Frontage Rd., Mountain View, CA 94043 (415/969-3355).

The AB Electronics mount is suitable for virtually any parabola between ten and twenty feet in size and it is available with a continuous rotation (west or east, switch selectable) or 12 position set and operate which takes you to pre-programmed satellite locations. Pricing is in the $1500 region. Microwave General offers a very handsome 'low-profile' mount intended to compliment expensively coiffured yards and includes optional digital indicators for antenna position (azimuth and elevation).

Manually adjustable mounts **can be** designed for relatively quick bird-changing but few are actually so designed. As noted, the STT **Gibson Satellite Navigation Manual** covers this problem (with solutions) in great detail. Briefly there are two approaches to mounts that move. One is called, 'polar mounting' and the other is known as an 'Azimuth over Elevation' (or Az-El) system. With a polar mount the antenna base is aligned precisely on a north-south alignment. By properly adjusting the elevation adjustment the polar mounted antenna can track through the full satellite 'belt' by moving in one plane (left and right). Azimuth over elevation mounts require two separate adjustments (one for left to right or azimuth as it is known and one for up and down or elevation). Computer charts tell you in advance what your proper headings will be for each satellite; an azimuth heading and an elevation heading. To move from one satellite to another with an Az-El mount you must make two separate adjustments and measure each one. The adjusting tools on the dish mount can be 'marked' or recorded for each satellite as you initially locate them and this shortens re-acquisition of a specific bird at a later date.

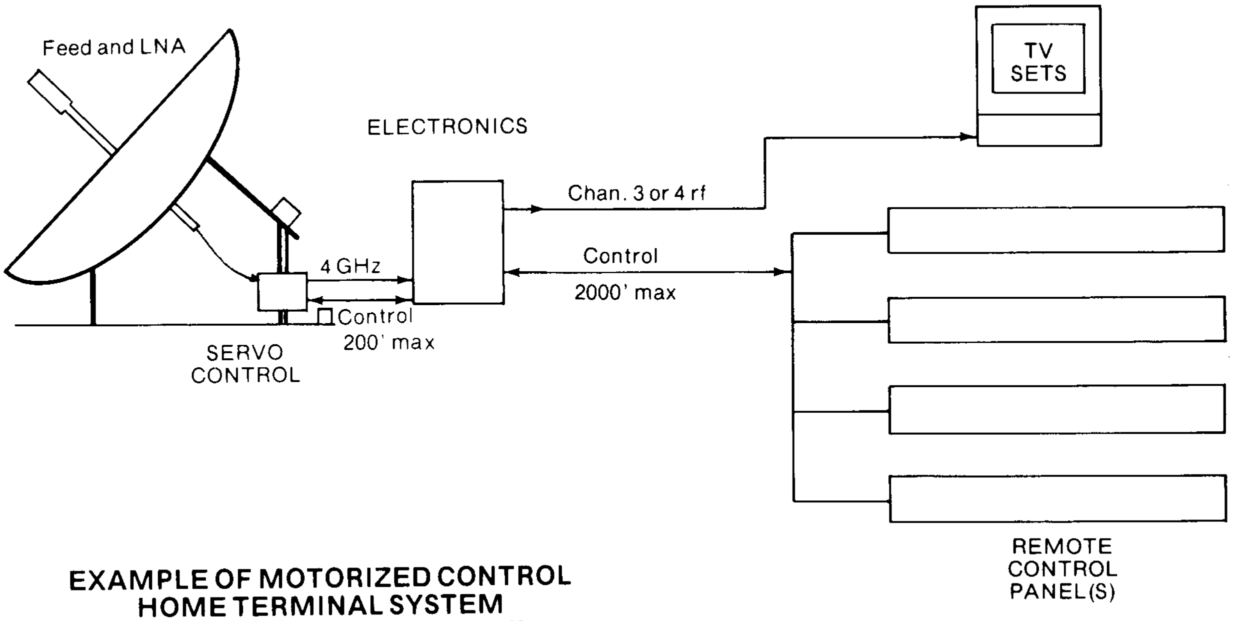
The process with an Az-El system is laborious however and **can be** quite difficult to assimilate for a novice. When you marry 'novice' to a 'pressure situation' (i.e. trying to find a specific event on a bird with a time deadline facing you) you may well turn up empty handed.

WHAT IS A DEALER?

In most endeavors of commerce a dealer is the last leg in the distribution chain prior to the actual consumer. Many products are sold via a 'two step' or even 'three step' chain that begins with the manufacturer, goes through a distributor or master distributor, and then goes to the dealer. Each has his own mark-up schedule and each has objectives.

In the TVRO field virtually all sales at the present time are either two-step (manufacturer to dealer) or one step (manufacturer to user). Most manufacturers in any field, this one included, would rather **avoid** one step distribution if they have a viable alternative. Let's see why.

When the manufacturer sells to the end user he is asking for trouble. The end user will buy only once (if he buys more than once, one presupposes he is a dealer and now it is a two-step proposition) and since this one purchase is his first purchase there is a great deal of learning required for the buyer. **The buyer expects to be able to ask for and receive assistance from the manufacturer.** Often in a new endeavor such as this the manufacturer selling the receiver or the antenna (or both) is called



EXAMPLE OF MOTORIZED CONTROL HOME TERMINAL SYSTEM
[Courtesy of Microwave General]

FIGURE FIVE

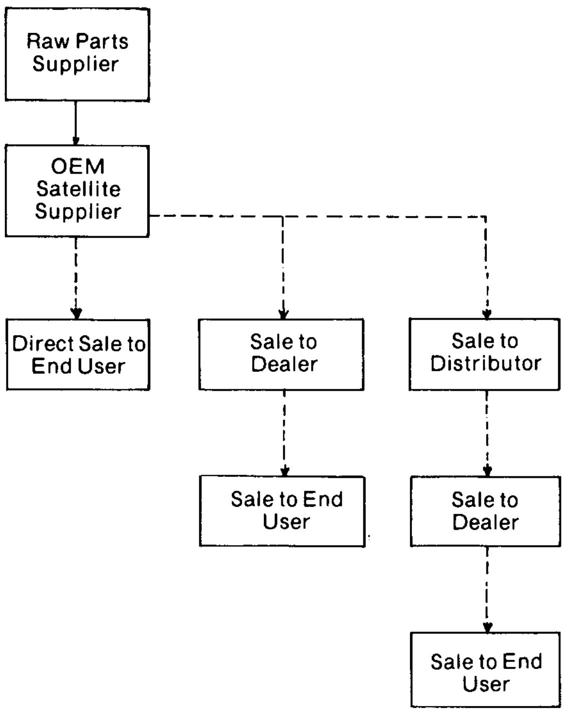

THE DISTRIBUTION SYSTEM

FIGURE SIX

upon to provide advice on every detail of the installation; even when his own product is not involved. This places extra-ordinary demands upon the manufacturer who finds himself having to guide and troubleshoot (usually via long distance phone) the novice installer through his first installation. As the many STT manuals point out, there are many things you can do wrong with an installation and it is not unusual (we are told) for twenty to thirty telephone calls to pass between the novice buyer and the manufacturer before the system is fully operational.

At our present stage of development the manufacturers in this field are simply not equipped to handle this type of extra workload. Obviously if they spend all day on the telephone they can't be tending to their primary responsibility; turning out product.

This is why most manufacturers in this field have elected to seek out dealers; firms who handle their product in a given area. There are two types of dealers involved at the present time; the installing dealer and the re-sale dealer.

The most common operating form is the **installing dealer**. This operation sells a completely packaged terminal on an installed basis. In other areas of commerce such a package is called 'turn-key' meaning that the installer handles the complete job through the point of completion and then when operating 'turns the keys over to the buyer'.

A less common form of dealer at the present time makes no installations but merely handles the equipment on a re-sale basis. As you might suspect there are variations of both as we shall see.

A manufacturer is willing to 'discount' his product from the retail price primarily because of two factors:

1)He discounts for volume purchases.
2)He discounts because he is shifting a part of the product 'work load' or 'burden' to another party or firm.

Volume discounting is self explanatory. It is a staple of the American system that anything you buy in quantity costs less per piece than the same item bought one at a time. The reasons for volume discounting are many, extending from the ability of the manufacturer to know (through planned or projected deliveries) exactly how much product he can ship this month, next month and six months from now to the simple function of increasing product sale through lowering pricing.

Discounting in return for the dealer assuming a part of the product 'burden' or cost-factor-load is another matter. If the original equipment manufacturer has properly apportioned his product cost factor he has built into the product a fair number of hours per receiver or antenna or LNA to satisfy the individual requests for installation assistance he will experience from end-user buyers. The TVRO receiver and antenna manufacturers in particular experience this type of additional 'loading' whereas the LNA suppliers saw this sort of field liason coming early in the game and took steps to divorce themselves from most of the field liason work.

For example, you virtually cannot buy an LNA from the original manufacturer; not in one at a time quantities anyhow (the exception to this statement is the SCI Division of Gardiner Communications). If you are buying a single LNA you find yourself dealing with a distributor in LNAs such as H&R Satellite Systems or Vidiark Electronics or AB Electronics. When you have a problem with the LNA (or think you do) you go back to **the distributor** for assistance. YES - there is technical assistance available at the original equipment manufacturer (OEM) but you get to that point **only after** exhausting the technical resources of the distributor you bought from.

Distributor? Yes, in the LNA field in particular there is a three step system in operation. LNA manufacturers seldom sell in lots smaller than 25 and 100 lots per shipment or order release are now quite common. Firms such as those mentioned above purchase in these quantities and resell (at a profit of course).

Is it possible for you to buy directly from LNA suppliers such as Amplica and Avantek? Only if you buy in a minimum of 25 units. Or, you can purchase in single lots from SCI and pay the full (then-current) retail pricing. Addresses of all firms mentioned here are found to the back of this Manual. Of course you can also buy from the LNA distributors in small quantities as well; that's why they purchase the units in the first place.

A dealer then is a re-seller of equipment. You buy at some discount structure (always negotiated with the supplier or OEM) and then either resell on a piece basis or resell on a 'turnkey package' basis. **So how do you become a dealer?**

LNA PURCHASING [120°K]

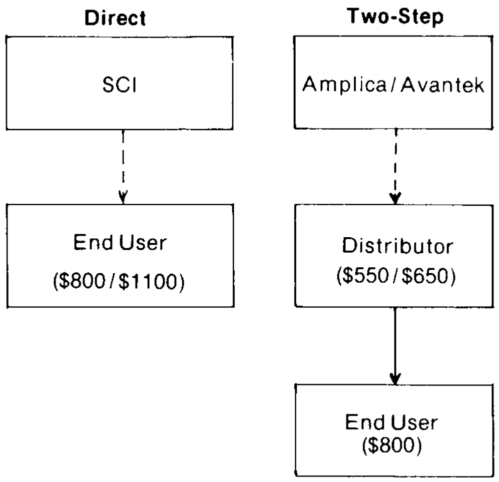


FIGURE SEVEN

QUALIFYING

In the early days of the home terminal industry about all you had to do to become a dealer was to say to the OEM 'I am a dealer'. That 'entitled' you to a dealer discounted pricing structure. This didn't last very long however as many 'dealers' turned out to be people merely looking for a discount; they were in truth one-time end user buyers.

The next phase to come along was a qualification process. The OEM, not anxious to discount his profit to a one time buyer, wanted more assurance that the buyer was in fact a dealer.

One of the simplest qualification processes is volume purchasing. International Crystal Manufacturing Company (ICM) employs this procedure. If you purchase 9 or fewer units at one time you pay the full list price. If you order 10 or more you start to get discounts. Must all be released (i.e. shipped to you or taken by you) at the same time? No, that is negotiable. Can you order ten and ask that only one be released 'now'? Probably not; ICM didn't fall of off the turnip truck yesterday!

Other manufacturers have different approaches to allowing dealer discounts to apply. AVCOM, for example, enters into a lengthy exploratory process with the would-be dealer. They are interested in your true intent and your long term abilities to move their product in quantity. The Washburn Receiver looks at your present business operations (i.e. are you in some form of retail business to start with or will you run this out of your house as an adjunct to your Tidy-Diaper route?) and makes a value-judgement as to your abilities to turn into a successful mover of their product. Sat-tec offers substantial volume discounts but puts the would be dealer through a qualification process before the discounts apply. Sat-tec in particular has been bitten by people who claim they are dealers but who end up only purchasing a single receiver.

Generally speaking receiver discounts fall in the 15 to 30% region; the variance being a function of true volume used and the differences in pricing philosophy between the receiver manufacturers. Several firms not yet shipping product in the receiver field (at this writing) but who expect to ship it during the fall of 1980 are planning even larger discount structures at least at the top of their discount pricing system where potentially very large radio user volumes per year are forecast.

This is an evolving system at the present time. No new ground is being carved up here; OEM suppliers in the TVRO field are going through the same type of learning curves and profit analysis periods that virtually every product to be offered to the public has gone through previously. It is best to go into this expecting a flexible, fluid system while both sides (the seller and the buyer) determine where the firm ground really is and how to avoid the quicksands that abound.

The truth of the matter is that if you can scrape up sufficient capital to install your own first terminal, that if you are serious about demonstrating that terminal and employ some reasonably active marketing program, you can find an OEM to go along with you. Everybody is hungry in this field and whereas a year or two down the road it may be very difficult to acquire a dealership right now it can be done with a minimum of credentials. But once you have that first terminal in and operating you had better be prepared to aggressively push and sell the product or you will find the second set of hardware much more difficult to acquire. In the best American tradition your own success and ability to function will depend largely on your own success. The Peter Principle was never more in force.

FINANCING

Do **not** expect any supplier to 'carry you' in this business today. There is a continuing equipment shortage and the pressures on the OEMs to produce equipment has them strapped for operating capital. They demand and receive full payment, often before shipment. In fact if you find an OEM that is willing to extend terms to you today it may be a 'red flag' telling you something not very good about the supplier.

Sure, as product becomes more available and the industry expands 10 to 30 day terms may become the routine for established, **good paying** accounts. But to start off with, especially on your first purchase, simply work out your own financing so you can meet the 'cash terms' demanded by virtually all suppliers.

How do you raise that initial $3,000 to $7,000 for the first purchase of hardware? If you do not have that kind of operating capital around you will have to borrow it someplace. What about a bank?

Charles Dascal, Chairman of the Board for the Continental National Bank of Miami owns his own earth (satellite) terminal. Dascal also has a considerable period of experience in electronics manufacture and importing of equipment for resale in the USA. He is therefore uniquely qualified, as a banker, to pass wisdom on to both other bankers and to retailers in this field.

"I was very much involved in the development and marketing of the earliest 8-track auto stereo systems. Later I was involved in bringing in from the Orient large quantities of CB (Citizens Band) transceivers. There are many parallels here in the home satellite field. First of all, the engineering work being done shows me that whatever the various pricing plateaus are today they will change by dropping quite soon. And probably with little warning. As a banker I would be very reluctant to loan money to a dealer to help him 'floor-plan' equipment".

Why is that?

"If I loaned a dealer money to allow him to commit to say a 25 lot purchase of LNAs from AVANTEK or AMPLICA, to place a firm order (with deposits) against 25 antennas and to place a similar order for receivers I would be very concerned that long before the dealer took his 25 terminals from the suppliers at the prices he had negotiated pricing would drop substantially. My borrower would be stuck with the product at the higher prices he had negotiated, maybe even stuck with product in inventory which he had paid higher prices for, and I would have a greatly diminished collateral base since what I loaned him $1000 for two months ago was selling on the market for say $800 today".

Now your banker may not be as astute in satellite terminal hardware as Chairman Dascal and you might be able to convince him that you should be extended a line of credit for 25 terminals. Dascal's concern is the negative side of the coin. On the positive side is the fact that if you go to one of the receiver suppliers with a bank guarantee of payment to the supplier and negotiate a price on 25 of anything to be delivered over a period of say 12 months (that works out to just two systems per month) you can probably get a pretty good deal from the supplier.

In the LNA area you **cannot** take extended delivery on 25 units. Since that is the minimum quantity which you can negotiate to buy as a 'distributor' you can expect to take the full release all at once. In effect, your borrowed money will be sitting in your warehouse at around $625 per LNA (120 degree Kelvin). As you sell or use in turnkey installations these LNAs you will slowly be retiring the debt.

In the receiver and antenna area, your bank-backed guarantee to take two per month for 12 months from the OEM will help him plan his own production quantities and material needs. If your bank provides the OEM with a 'letter of credit' guaranteeing payment for each release-lot of two as shipped, the OEM should be quite happy to have you as a dealer. **So how can you be protected on price decreases?**

One way to do it is to negotiate a deal which says that your pricing is at the 25 lot quantity discount price at the time of the agreement; but further, that **if the price drops** during the course of the delivery that you will be accorded the **lower** pricing structure as well.

Shifting the shoe to the OEM's foot what happens if he has to raise pricing? Yes, **he** can be expected to seek a clause in the agreement that says he gets a higher price if you ask and receive a clause according you a lower price. That way both parties are 'protected'.

This is not what concerns Dascal however.

"Price drops by the supplier my borrower is dealing with are usually handled in a straight forward manner. What concerns me is the inventiveness of the whole field. I envision that we will have **new** companies or **new** products from other companies already in the field that will pull the rug out from under my borrower. This is a very fluid technology. Someplace, right now, I just know that there is a fellow out there working on a test bench someplace who has 'the answer' to $500 high quality receivers".

Is this really an area of legitimate concern to the banker?

Let's say that you have a commitment for 25 systems using a receiver from this OEM, an antenna from another and then 25 LNAs released in a single lot carefully locked up in your warehouse. And let's assume you are in the market in your area with a $6,995 package; turn-key installed. Your marketing program has you projecting sale of two complete packages per month and you are on schedule.

Then through **CSD** you see that somebody has popped out with a $500 TVRO receiver. After the usual skepticism and checking out you decide that they have the answer. Your problem is getting out of the commitment to the receiver manufacturer before your year is up.

Can you do it? Probably. And it will cost you some money to do so.If you have been paying $1200 for your receiver portion of the package that extra $700 'profit' looks pretty good.The present receiver manufacturer tells you that he doesn't want to lose you as a customer but he cannot compete with the $500 receiver; today. You say OK, you will be interested in his product when he can...now what will it cost you to cancel the balance of your order? The answer might be an extra $100 **per radio** for those radios you have **already taken delivery on** (they call this short-rate canceling of the order). In effect the $700 extra 'profit' you were going to make on the installations with the new super-low priced receiver will drop to $600 for some of the radios you sell. Still not a bad deal.

The key point to remember here is that when you commit to purchase a quantity of satellite hardware the only real item you take instant delivery on is the LNAs. The balance of the equipment will come to you on a scheduled basis, over the period of the year (or whatever) as you and the OEMs have worked out. So your actual inventory-capital invested 'exposure' is limited to the product you have in stock at the moment.

Can you make arrangements to be a dealer for fewer than 25 packages per year? Sure, but remember that quantity pricing applies to most of the OEM sales conditions. They need projectable, predictable delivery schedules themselves to handle the inflow of microwave component parts. When you deal in the '25 per year' area you are at about the lowest 'per month' level which they can respond to. In effect, they plan to set aside two of whatever it is they build for you each month for a year. Half of 25 is about 12 so it is possible to start off at a level that brings you one complete terminal per month (or 12 per year). They plug in your one unit per month and that single unit becomes a part of the bigger package of whatever their total production is per month.

Smaller order quantities however don't fit the 'orderly scheme' of some set number per month (even if that number is but one per month). Yes, you could schedule or ask to schedule one every three months (four per year) or some other combination but this creates odd month scheduling for the OEM which he doesn't like very much. The risk you run if you don't take product **each** month is that your 'uneven delivery schedule' will get lost in the shuffle; some larger customer will find he needs an extra receiver or two one month and then you won't get one.

One of the major problems plaguing the OEM these days in the receiver field is the unpredictable nature of his own parts deliveries. A number of critical parts must come from outside suppliers who to date have shown little ability to adjust to rapidly changing needs on the part of our OEM. When one of these critical parts slows down between its factory and our receiver OEM, everything backs up all down the line. Thus the matter of creating an 'orderly, well planned' year parts flow, in advance for 12 months, is more than a simplistic desire to be 'orderly'. It is almost essential for our receiver OEM if he is going to keep his own product moving out the door. Your 12 month commitment helps him do that but you must understand that you need to be accurate in your own appraisal of what you will take and sell in the coming 12 months since an underestimate on your part cannot be simply corrected for at the OEM level; he simply won't have the parts coming in to build you additional receivers!

FINANCING / TWO

If the new dealer must work out his own local financing to open up shop, what about the dealer's customers? How do they come up with the cash to afford a home system?

Miami's Charles Dascal of Continental National Bank does not see home terminals being adequate stand-alone collateral at this point in time. "The terminal, unlike the new car (collateral) has no blue-book value. It is too new to have a track record and when you consider that the pricing trend is downward I would be reluctant to loan on the terminal alone". Dascal feels that people who want to borrow money to pay the dealer his full installed price are going to have to use assets they already have, with established value, to borrow the money. "I would be concerned about loaning $8,000 to someone to buy an installed terminal if the terminal was my only recourse. With prices tumbling I might find the bank reclaiming a terminal with $8,000 against it when the market had dropped in half in a few months".

SYSTEM FINANCING

System Cost	$10,000.00
Down Payment	2,500.00
Financed	7,500.00
At:	
36 Months	300.00
48 Months	200.00

FIGURE EIGHT

This then says that the dealer is going to have to handle terminal financing in some other way. Finance companies, usually less sophisticated than banks, are one possibility. "The customer really needs to arrange his own financing" comments Dascal "although the dealer should expect to provide detailed descriptions of what it is the terminal consists of and what each part costs the buyer''. This means that if you expect to be selling terminals, you should pay a visit to several local lending institutions **before** you set up shop and approach them about financing. A few dealers have been able to work out financing packages in advance and having a prepared monthly payment schedule worked out on paper certainly does enhance the possibility of a sale in many instances. ''If I were a dealer in these terminals today I wouldn't want to be put into the position of having a blank on my face when the potential customer asks 'How can you help me finance this?' '' adds Dascal.

One of the standard practices with both banks and finance companies in new technology areas such as this, if you can get their attention, is for them to require that the dealer (you) be prepared to take the system back from them if they have to repossess. This places you in a position of in effect having to guarantee the loan to the customer since if you are legally bound to take the system back the bank or finance company knows that, subject to your own financial stability, there is little risk for them involved. Such 'with recourse' loans are common **and to be avoided** if at all possible since as a dealer you will not be anxious to take back a $8,000 terminal that has dropped to $4,000 value because of changing market conditions. Still, it may be the only way you can get the customer financed and a terminal sold.

If your own financial strength is on the light side you may have to go out looking for a third party to take in as a 'silent' partner for the sole purpose of guaranteeing the 'with recourse' loans. It is not unusual in the business world for someone with strong assets to ask for and receive say a 25% interest in your company (typically including 25% of your profits) in return for which he (or she) stands behind your paper at the bank or finance company. If all of your sales stick and there are no loan defaults, the person standing behind you never puts out a dime. But their financial strength is there, on paper and legally, to back you up while you get started. One way around this is to tie such an agreement (some percentage of your company) to a term in time; say on a year to year basis wherein you have the option at the end of the first year to either re-new the agreement or to 'buy out' their interest at some pre-determined price. If you take this approach to finding a silent backer you can get the assistance you need in the first 'tough' year but

EQUIPMENT in our field is exotic and exciting. But not to a banker. Don't expect him to share your appreciation for PLL receivers and 100 degree LNAs!

still have the ability to regain 100% control of your company at the end of a year (or two years, etc.). If you have difficulty finding such a person on your own, talk to your banker. It is part of the banking business that they know who has surplus cash around and who is in the 'business' of providing 'silent backing' for new business ventures.

Don't make the mistake however of trying to sell the bank on **the value of the equipment itself**. Even if they are not astute and like Miami's Charles Dascal up to date on the changing technology and pricing in this field, bankers by nature are extremely cautious about assigning any 'resale value' to exotic equipment. **If they don't understand** what **it** is or where the market is, don't waste your time **trying** to sell them on it. A banker in Gridley, Kansas has no desire to have a 120 degree LNA, 24 channel receiver and a 12 foot dish in his vault.

CAN YOU MAKE MONEY?

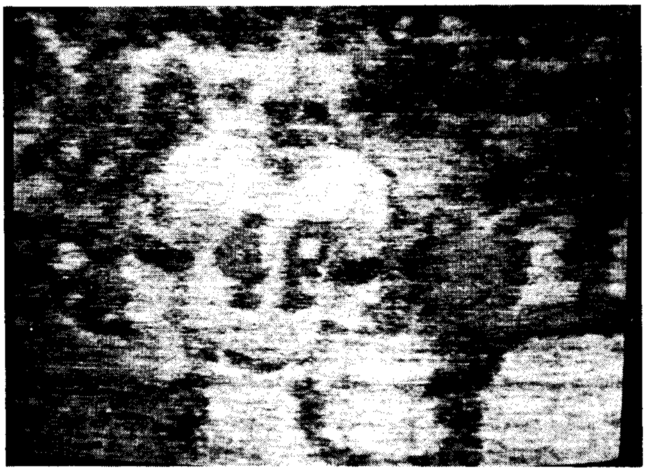
There is a tremendous danger in the exotic satellite field to overlook the usual key question in any business deal; namely, can you make money selling terminals?

Sadly **it is not automatic**. And while many business publications have written in glowing terms of the 'business potential' and 'business opportunities' presented by the onrush of satellite technology, most such reports assume that anyone entering the satellite field is going to do so as a stockholder in a public company or as a well heeled private investor through perhaps some large corporate entity. Is this in truth a business field for the 'little man' with limited resources?

Since the first major public exposure of low cost satellite terminals in 1978 virtually all of the press has dealt with the pricing schedule. Most of the **pressure** has been on reducing the total system price. Unfortunately as this price reduction has occurred there has not been universal quality improvements nor has the reception quality even kept even with pricing drops.

If you are seriously considering entering this as a dealer in hardware, your first concern must be that you have satisfied customers. Two ingredients enter the 'satisfaction' equation; the quality of the service initially, and, maintenance of the system. Let's deal with service quality first.

As I write these words a television receiver sits running some 10 feet away. On the screen is the Oklahoma/Texas football game in mid-October. The picture, via WESTAR I satellite, is not perfect. In fact it is by my own standards barely watchable. Under normal circumstances I would not tolerate such a picture on my television set. However, there are mitigating circumstances. First of all I am writing this in the front room of a home on the island of Providenciales in the British West Indies. I am far outside of the United States and intensely interested in how my 'home team' (OU) may do this afternoon against long time rival Texas. Therefore, because I am not where high quality reception of this game is possible, and because I have a higher than normal interest in the action I am watching over my shoulder, I will tolerate less than perfect reception.



A PICTURE only a fan could love. People are 'subjective' in their analysis of picture quality; the more intense their interest in the program the less the real picture quality means. Re-runs of I Love Lucy had better look darned good however to hold viewer enthusiasm!

People are subjective in their analysis of television quality. People are very intolerant of reception which does not measure up to their own subjective standards. Now visitors to my living room believe this is the finest television possible. These people have never seen television before other than perhaps some videotaped programs. Many people, given the choice between the quality of this football game and the quality of the videotapes they are familiar with would select the football game; simply because **it is 'live'**. I have watched their interest in old movies and other programs received here by satellite. And that interest quickly wanes, they become critical of the noise in the picture and soon lose interest in the reception.

This says that when you are selling terminals, you can expect your local customers to judge the reception based upon what they are accustomed to receiving. NOW - how do you 'control' the reception quality and how does this impact upon your own business success?

Naturally you would like to provide as high quality reception as possible. BUT - you may not realize just how thin the line is between high quality satellite reception and a picture that jumps about with noise and the jitters. Let me draw upon my own experience here on the island of Providenciales for illustration.

We arrived here with an 11 foot ADM parabolic antenna waiting for us on a pallet. Within a week we had it assembled and were receiving stateside pictures on at least two of the WESTAR birds and one COMSTAR bird. Picture quality varied from good and enjoyable on COMSTAR to watchable but only enjoyable if you had an interest in the program material on WESTAR. This was to be a temporary antenna; we knew from doing our engineering before we arrived here that an 11 foot ADM antenna was simply not enough antenna to pull in good pictures this deep into the Caribbean. But we also knew that it would be a couple of months before we could get a larger 5 meter AFC/Microdyne dish down here and installed. The primary satellite of interest here, as in the CONUS area, is SATCOM FI. From our island this bird is low to the horizon (17 degrees) and we are far down in signal level here. One day we went looking for SATCOM FI **with** the 11 foot ADM antenna; **just to see** what there might be there. We found it alright; not strong enough for color, terribly laced with jittering line and noisey sound.

When the 16 foot AFC antenna did arrive and when it was installed we went right to the rough test; SATCOM FI. On all but one transponder (21) the picture on FI was as good as or better than our COMSTAR reception with the ADM antenna and in all cases better than our WESTAR reception with the ADM antenna. Now the important thing to note here is that the antenna size difference between the ADM and the AFC is only about 5 feet. But the difference **in picture quality** is astronomical.

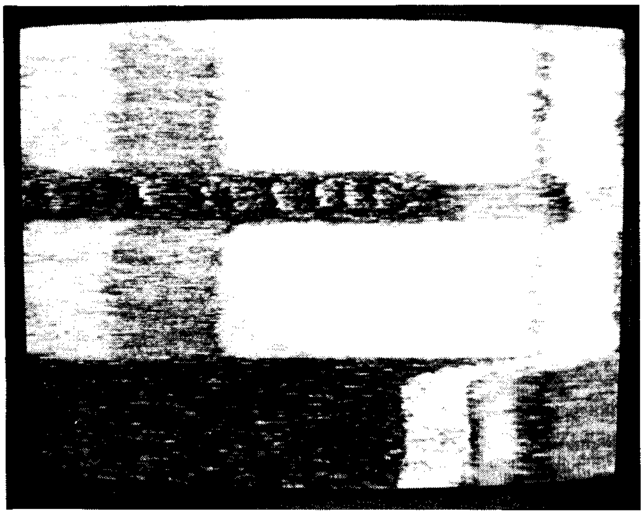
How can that be? Well, the satellite system employs something called 'FM' to transmit the picture and sound. FM has a 'hidden factor' called threshold. And here is what it means and how it works.

'FM threshold' is a measurement of system performance. Let's number from 0 to 10 and make 10 a perfect picture and 0 no sign of any picture. Here's what we have on our screen.

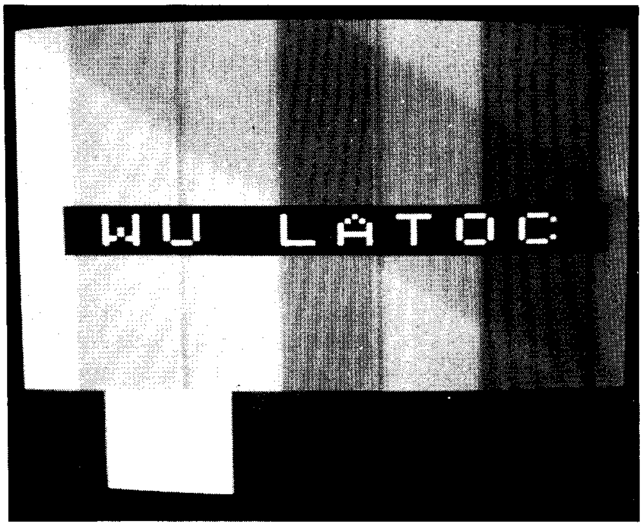
0 - no picture or sound
1/5 - weak picture, too much jitter to watch, raspy sound
6/8 - jittery picture you can watch, sometimes good enough to enjoy, almost 'clean' sound
9/10 - Perfect picture and perfect sound.

Now on our ADM antenna, when pointed at SATCOM FI, we had a picture in the 3 to 4 region. The additional surface area (and therefore antenna system 'gain') with the 16 foot AFC antenna brought us up into the 8-9 region. Everything else (LNA, receiver) stayed the same. The message here? Obvious enough...**there is a very thin area** of performance, **between** a weak picture with too much jitter to watch and a near-perfect picture.

How does this relate to you? Too many of the installations sold to date have settled for pictures in the 6 to 8 region when an 9 or 10 was but a next antenna size larger away. It is absolutely true that a good quality (9 or 10) satellite signal is the best looking television you will ever see; anyplace. It is also absolutely true that anytime you can deliver that quality signal to your customer(s) you will have a benefactor for life.



THIS PICTURE IS A '5'...



BUT IT COULD BE A '9' with a just slightly larger antenna.

That thin margin between "we get a signal...not good" and "we have a perfect picture" is primarily a function of antenna size. YES - there are things you can do with an LNA (install one with lower noise) and receivers (install one with a lower 'threshold') to **partially** compensate for a smaller antenna but there is nothing you can do with any combination of lower noise amplifiers **and** receivers **to totally make up for a small antenna**. Period.

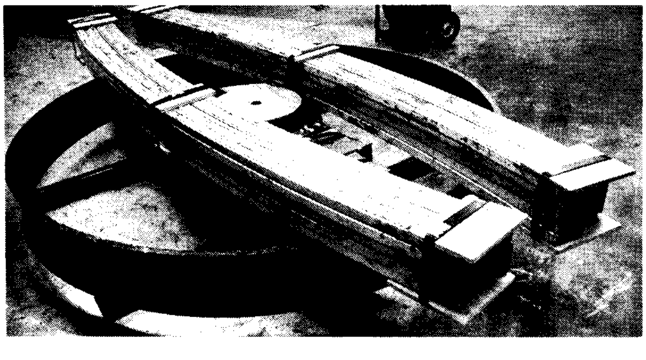
Yet people persist in installing 10 foot antennas where there should be 12s and 12s where there should be 14s. Or they choose a 14 that is poorly designed and it performs like a 12 (or a 10 that works like an 8!).

The message should be clear. Of all of the decisions you make regarding equipment, the antenna selection is perhaps the toughest and also the most critical when you are dealing with small terminals. Let's see why.

1)**Not all antennas of the same size deliver the same performance.** The art of satellite antenna production is hardly new but it is new to many of those building and selling product. **There is** a fairly high level of technology involved in turning out good antennas. The difference between a fair antenna and a good antenna of the same size may be as much as 2 dB. How much is that? Well, it is the difference between having a 12 foot and a 15 foot for example.

This tells you that there is more to selecting a satellite antenna (line) than the appearance and shipping ease and assembly ease. There is actually quite a bit more than these 'surface' factors.

A parabolic antenna achieves its gain because it is of a precise form with close tolerance parts making up the surface. In addition to the need for the parts to fit together well (when parts do **not** fit together well the close tolerances required to achieve maximum gain are lost) we must have a uniform contouring of the full surface area. If you read **CSD** you may have noted the 'claim' of the Paraframe antenna which states that a 'proofing template' is supplied with the antenna. You may not have understood what a 'proofing template' is. Well, when Paraframe antennas go together (and in all honesty they are NOT the simplest antennas to assemble) you have a factory provided 'template' that fits into the dish cup or contour. The template allows you to precisely adjust the surface contour (curve) of the dish so that the full dish when assembled is uniformly curving in the proper form. By going to this extra step Paraframe assures users that the gain they get with their antenna will be maximum gain simply because there will be no surface errors on the dish.



PARAFRAME proofing template allows very careful field adjustment of antenna surface accuracy so that the user receives maximum system gain and best quality pictures for his efforts.

Surface errors greater than + /- 1/16th of an inch begin to degrade the actual dish gain. This happens because (as you will recall) the dish surface is really a giant concave mirror catching satellite signals on its surface and then reflecting or bouncing those signals to the focus point/feed antenna. Now when the curvature of the dish is such that there are errors in the surface greater than say + /- 1/16th of an inch, the satellite energy striking that portion of the dish that is 'out of tolerance' do not reflect or focus properly at the focus point / feed antenna. In effect the signal captured by this out-of-tolerance portion of the antenna surface is **lost**.

Errors can be over a sizeable error of the dish (such as may happen if a section, panel or side of the dish is 'warped') or it can be the accumulative errors of repetitive 'ridges' on the dish. For example the STS of Missouri and the ADM antennas both use panelized sections. These panels bolt together to form the full dish surface. Where the panels join together there is a small 'gap'; typically in the 16th inch region. But if the panels go together poorly (either assembly error or manufacturing tolerance error) those gaps (there are 24 panels and 24 gaps) can be as much as ¼th inch (or more) apart. Where there are gaps the satellite signals don't get captured. There is therefore some loss with the antenna; loss being defined as less 'real world gain' than the antenna has 'on paper'.

Other antennas come in multiple sections; say two (halve sections) or three or four. Wherever antennas go together in pieces the opportunity for the antennas to not go together properly is present. A three section antenna, with one section displaced below the surface area of say the other two sections, may work only ⅔rds as well as it should.

NOW - in addition to the reflective surface accuracy/error problem there is also another important antenna consideration. With the satellite energy actually being collected by the small focus/feed point antenna, we have a new element for error in the system. The ideal feed point antenna would be designed to capture **all** of the signal energy focused to it by the reflector. Unfortunately for engineering reasons such an 'ideal antenna' cannot be used in the real world so we have compromises in the design of the feedpoint antenna. Those who read the literature see advertisements for the Lindsay LS9-35 'circular scalar style' feedhorn and the Chaparral Communications 'Super Feed'. Both feed antennas make **claims** that they will **increase** the signal 'gain' of your satellite antenna **system**. What they are telling you is this. Engineers do not agree on just how the feed or focus antenna should be designed to pick signal up from the antenna surface. Some engineers believe that it is possible to design the feed antenna so that you may achieve from .5 to 2 dB more antenna signal gain using their special feed than you could get with a 'standard' feed.

Now for years a 'standard feed' has been a simple looking horn device. There is a gentle technology that teaches engineers how the horn should be flared, what its dimensions should be, and how it should be constructed. The horn served microwave users very well but more recently the art of feed design has been shaken up by some variations. And the arguments have ensued and even continue.

It is a fact that feed design **does effect** overall antenna efficiency. **It is also a fact** that **if** you take the feed off of the LNA, so that the hole-opening in the front of the LNA itself 'looks' at the reflector surface of the parabola, **you will see something**. How's that? Well, at microwave frequencies any opening (or hole) leading **into the electronics** will 'pass' signal. Remember that the parabolic reflector collects energy and reflects it in a focused way towards the feed point where the LNA plus feed antenna is located. So it happens that even without a feed antenna attached to the LNA **some** microwave energy does in fact get into the LNA.

If the energy gets in anyhow, what does the feed antenna then do? It acts like a funnel; it captures the signal from the surface and gently leads or 'channels' it into the opening in the LNA. And it turns out that **some** funnels are more effective at this task **than other** funnels. The newest breed of 'funnels' look less like real-world funnels we are acquainted with than the older horn style antennas. This 'strange look' gives us part of the arguments that the new fangled devices are not all they are cracked up to be.

The proof however is in the performance. And whereas most of us can envision how a simple horn looks like and therefore acts like a 'funnel' the newer family of horns with ridges and circles and odd shaped metallic sub-structures doesn't look right. In tests conducted by **CSD** and other independent bodies there is strong evidence that feeds such as the Lindsay LS9-35 and the Chaparral 'Super Feed' **do indeed** improve the performance of the antenna system. The arguments, as they continue, relate largely to 'how much more performance' do these special feeds provide. In most cases it would seem to be no less than .5 (½) dB. In the best cases it may be as much as 2 dB.

The premium price one pays for an improved feed is in the region of $125 to $200. Now since even a ½ dB difference represents a worthwhile improvement, it would appear that such an additional expenditure makes excellent sense. And in the best case with an improvement up to 2 dB the dollar trade for performance is not debateable.

At least one antenna manufacturer (ADM) now routinely provides the 'Super Feed' as a part of their basic antenna system. The Lindsay LS9-35 is part of the basic Lindsay family of antennas as well. However the feeds can be added to **virtually any** parabolic reflector (provided it meets something called the correct f/D ratio; .4 to .6 is the right number range).

We began this section by asking the question 'Can you make money?'. The question persists. You will make money provided you never lose sight of the basics in this business. When a slightly mis-adjusted antenna can make the difference between a '6' picture and a '9' picture; when improper LNA selection can cause the difference between a '7' and perhaps a '9'...when so much of what you do depends upon how well you do the 'little', basic things...the future of your business is truly in your hands.

WHAT ABOUT SYSTEM PRICING?

With some equipment hardware prices dropping rapidly it would appear that the market is getting bigger. It is a basic fact of American economic life that the lower the price drops on a product the more people who can afford the product. But what is really happening here is more than price drops; there is a quality drop as well, and it may be that for this point in time the drops in price are not being offset by the perception of value placed on the product by the customer.

Let's go back to the business of system quality briefly.

It is possible to piece together a total system package at a dealer cost of $2105 as of this 'writing' date. What 'package' is that?

1)Sat-tec R2A receiver ($750)
2)8-Ball antenna ($505)
3)120 degree LNA ($650)
4)Modulator ($100)
5)Coax/connector package ($100)

The above pricing reflects 25-lot purchasing power and if you attempt to do the same thing one-time-only you can expect to spend another $445 ($2450 total). Now...while it is **possible** to acquire grade 9 to 10 pictures with this system, is this the type of system you want to be selling?

SETTING UP AS A DEALER

Month #	Equipment	Investment
One	25 LNAs	$15,625
	1 Receiver	920
	1 Antenna	1,900
	1 Modulator	100
	1 Cable Kit	100
	1 Hardware	250
		$18,625
Two - Thirteen	2 Receivers	$1,840
	2 Antennas	3,800
	2 Modulators	200
	2 Cable Kits	200
	2 Hardware	500
		$6,540

FIGURE NINE

First you must understand that the ingredients in this package are largely designed for assembly by 'hobbiest' enthusiasts. The Sat-tec receiver (the A version in particular) does produce a good quality picture. But not as high a grade picture as a receiver costing more money. The 8-Ball antenna is a do-it-yourselfer delight. It is a medium sized project to assemble (the plans and instructions are good) and there is some satisfaction in doing it yourself if the user is so inclined. Since the Sat-tec receiver produces video and audio you need a modulator (from S.T.E.S. or some equivalent unit) to convert that video and audio to a TV channel signal.

BARE-BONES RETAIL PACKAGE

1) R2A Receiver	$750
2) 8-Ball Antenna	505
3) 120° LNA	650
4) STES Modulator	100
5) Coax, Connectors	100
	$2,105

(Based upon 25 lot purchase)

FIGURE 10

Now can or could you sell this 'package' and make money? Yes, but with many conditions. First of all, this is a 'bare bones' system. The buyer needs to be satisfied with pictures in the 7-9 region (they will vary from bird to bird) and he has to be prepared to accept manual adjustments in lieu of automatic adjustments.

How would you sell it? Well, while it is possible to sell it as a 'do-it-yourself' package for say $3195 (that's a 52% mark-up) you had better be prepared to assume the posture of the direct-selling OEM. How's that? **Be prepared to give the buyer lots of assistance** in getting the terminal up and running, and most of all **do not mis-represent** what the terminal is capable of doing. Because signal levels do vary across the US and Canada (see **Coop's Satellite Operations Manual** from STT) the best approach is as follows:

1)Buy a system yourself and install it.
2)Round up a color video camera and tape yourself putting it together.
3)Prepare from that tape an edited version that runs say 60 to 90 minutes showing someone else how it goes together. Show good detail, get in close with the camera, depicting every step of the operation. In particular spend time on the 'bird hunting' exercise showing the viewer how you look for the satellites and how to adjust the feed antenna for best reception.

Having determined just exactly what kind of quality the buyer can expect with such a terminal in **your** part of the country, be prepared to explain transponder by transponder, bird by bird exactly what you get **AND** how well you get it. This may seem like negative selling when you **honestly point out** that some transponders are **not** perfect but in the long run it will save you from many unpleasant hassles with customers who bought a terminal expecting every transponder on every bird to be perfect.

This type of package, accompanied by a reasonably well done "How To Put It Together" videotape prepared by your firm should take from 12 to 20 man hours to completely assemble and install; for 'first-timers'. For someone who has done this exact system before you could be up and running in as little as six man hours.

YES - you can modify this bare-bones package with other substitute equipment; and bring the price up somewhat. One approach is to offer a system package **such as this** ONLY as a 'do it yourself' package. Provide the video instruction tape as a loaner, you get it back after they complete the installation. You might even package in one 'two hour inspection visit' of the terminal, after **they have it assembled** and operating; kind of a 'check out session'. The cost to you of such a visit should be built into the package of course which means the buyer may end up in the $3300 or so region.

The most important thing with bare bones systems is that you **carefully and accurately represent to the customer** what he is buying and where he must expect less than 'grade 10' service. Many-many buyers **will** be willing to start off with such a system when they see that they can shave big dollars off of the installed terminal pricing. Let's look at that now.

THE 'SIMPLE' TURN KEY

Recall that a 'turn-key' installation is one which the buyer expects to be fully operational when you are completed. Installed **and** operational.

Virtually all antenna mounts require some type of concrete in the ground to stabilize the antenna. Remember that we are dealing with an extremely precision system and that antenna pointing errors in the 1/16th inch region can make the difference between a grade 7 or grade 9 picture; sometimes even more of a difference than that! Some antenna mounts can be on a single piece of concrete (called a 'pad') while others require two or three or even four smaller pads called 'piers'. While it is possible to dig a hole (or holes) in the morning, pour concrete (with a few percent of Calcium added for quick drying) and mount the antenna/mount **that** afternoon, more likely you'll put a day or two between the ground work and the antenna work. This immediately means two complete trips by the installation crew and of course that's money out of **your** pocket.

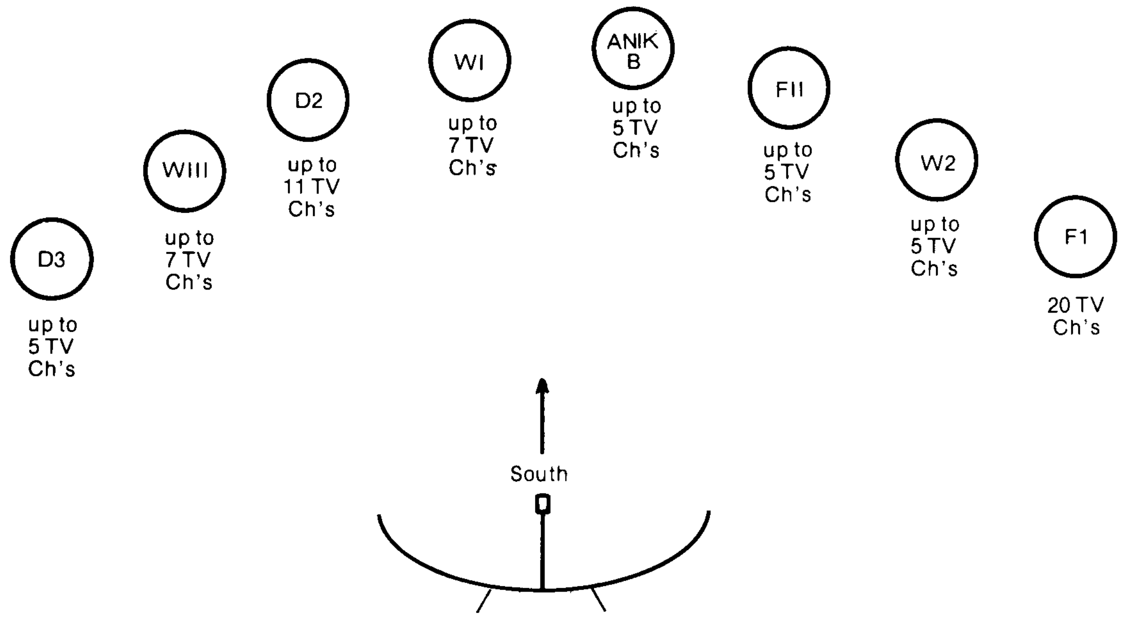
Getting the in-ground foundation installed is more than just digging some holes and pouring them full with concrete. Polar type mounts, in particular, must be very precisely aligned (north by south) or you will find that the antenna does not 'track' the satellites properly. Even less complicated mounts (azimuth over elevation) have precise ground location patterns for their bases and you should count on sending along at least one reasonably bright fellow to make sure it is done correctly.

The bottom line on the ground work is do it carefully; make sure the chap overseeing the job understands **what** he is doing, and don't spare the concrete! Even a 'small' ten foot dish presents a considerable wind surface area (load) on the mount and you don't want to be heading out to do maintenance on an antenna system in the middle of the winter's worst blizzard.

The simplest mounting system is one that allows you to locate a single satellite (such as SATCOM FI) and then leave the antenna fixed on that satellite. Most of the parabolic antenna manufacturers offer such a mount with the notation that you '**can** change satellites' if you wish. Yes you can...**but try it yourself first** with one of their units. See what you have to go through to move from satellite to satellite. It is better that **you** do the mechanical work of changing rather than allowing them to demonstrate it to you. Why? Because there is a 'sixth sense' or 'feel' which people develop as they work with antenna mounts for awhile. If **you** change one often enough **you can make it look very easy**. If you are selling their system your customer will not change it that often so when you step in there the first time and do it you are in effect going through the same process your customer will go through. Just because it looks easy does not mean it is easy!

SPHERICAL ANTENNA uses different geometry than regular parabola and allows reception from multiple satellites (located within its "window") **without moving full antenna surface** (only feed moves).

Let's talk about the differences between the Spherical type antenna and the parabolic. On the surface the Spherical seems like a great answer because you don't move the reflector surface at all; you simply move the small feed antenna about at



THE NORTH AMERICAN SATELLITE BELT

FIGURE 11

ground level on a small tripod. However the Spherical has some disadvantages you should be aware of. Perhaps the most important of these is that 'field of view'. The Spherical surface looks at a segment of the 'satellite belt'. Depending upon which Spherical we are talking about, that 'segment' may be 30 degrees wide or it could be as much as 40 degrees wide. If we start off assuming that the Spherical reflector will be so positioned that it will include in its 'field of view' the RCA SATCOM FI satellite at 135 degrees west, we can then calculate quite simply how much of the balance of the satellite belt the Spherical in question can 'see'. If the Spherical 'window' is 40 degrees wide (very few are - check with the supplier) you **might** cover the region from 135 west back (east) to 95 degrees west. That takes in WESTAR I, COMSTAR D2, ANIK B, SATCOM FII, WESTAR I and SATCOM FI. But it places two important birds (FI and D2) at the very **edges** of the 'window'; at 135 west and 95 west respectively. It also leaves out WESTAR III at 91 and COMSTAR D3 at 87 degrees west. The same calculation procedure applies to the 30 degree 'window' of other Sphericals. Assuming you want FI at 135 degrees included, you can cover from 135 back to 105 degrees.

Unfortunately these numbers are the **ideal** set of numbers; **your actual look 'window'** is going to depend upon your own location and you may end up with fewer satellites in your 30 or 40 degree 'window' than the ideal situation painted here.

This says then that while the Spherical presents a relatively inexpensive way to cover multiple satellites without a big, bulky, antenna **mounting system** that can be adjusted through the sky you are trading economy and ease of operation for a less-than-full set of satellites at **your** location. It may not matter to you or your customers; you may feel that the FI bird 'plus a few' is all that you want or need. Judging by the way the 8-Ball Spherical antennas have taken off in sales many people feel that the lower price is a fair trade for less than a complete sky view.

There are some schemes about to install two or even three Spherical reflectors so that they do indeed, working together, cover **all** of the sky of interest (see **CSD** for October 1980). However we feel that most 'viewing-**customers**' may not share the love-of-the-system that they would allow **multiple** reflectors in **their** side yard.

So the simple turn-key, more often than not, will consist of a **parabolic** type antenna, with a hand-movable semi-fixed mount and the antenna will be left pointed at FI. How does this package go together?

1)ICM Model 4300 receiver with remote control package ($920)
2)ADM 11 foot antenna with polarization rotator and Chapparal 'Suepr FEed' ($1900)
3)120 degree LNA from Avantek or Amplica ($650)
4)Modulator ($100)
5)Coax cable/connector kit ($100)
6)Hardware and approximately 4 yards of concrete for base ($250)

These prices are based upon having negotiated in the **25 unit range** from **each** of the suppliers used for illustration. Unlike the 'bare-bones' or 'cheapest' priced package there are several substitutions in hardware which could be made which would not effect the pricing total substantially. This package comes to a dealer cost of $3920.

The selling 'features' here are as follows:

1)The ICM receiver has six switch selected audio sub-carriers including one that can be manually tuned. This assures the viewer of access to **all** of the audio sub-carrier frequencies.
2)The ICM receiver has a three wire remote control package which can be located virtually anyplace. This allows the viewer to change transponders from his easy chair and in a more deluxe installation every room in the house with a TV set could be wired with a wall jack into which the remote control package could be plugged. In this way the full receiver could be tuned from any room where there is a TV set.
3)The Chaparral 'Super Feed' assures the 11 foot antenna will produce peak gain. Additionally, since ADM includes a polarization control system the viewer will be able to select between horizontal **and** vertical polarization from an inside control (rotating the feed horn by remote control).
4)If the ADM antenna is carefully installed on a north-south axis it acts **almost** exactly like a 'polar mount' which means that **by hand** the antenna can be moved from satellite to satellite with only a single adjustment.

NOW - what could a 'simple turn key' such as this sell for?

Well, after you have done a couple the total time involved in this installation will be in the 12 to 13 man hour range. Three to four of these hours are spent getting the base foundation ready. We'll come back to that shortly.

With up to 14 man hours plus $3920 of your money invested you can**not** afford to sell this installed for $4995 (everyone wants to stay under $5,000 it seems!). But, on a turn-key basis you can afford to sell it for $5995 (53% markup) or even $6495 (66% mark-up). At $5995 each if you sell two per month (or 25 per year) you are taking in nearly $144,000 per year ($12,000 per month). If you set out to sell two per month, using two weekends a month to sell and two weekends per month to install, you will net yourself around $4,000 per month less the value of your time and whatever help you employ to assist with the installation.

This last advice regarding antennas which require some put-together time (the ADM involves

13 MONTH CASH FLOW PROJECTION - 25 TERMINALS PER YEAR
[At $5995 Per Terminal]

Month	Investment	Sales	Net	Cash Position
1	$3,920	-00-	-00-	-$ 3,920
2	$7,840(+)	$11,990	$4,150	+$ 230
3	$7,840(+)	$11,990	$4,150	+$ 4,380
4	$7,840(+)	$11,990	$4,150	+$ 8,530
5	$7,840(+)	$11,990	$4,150	+$12,680
6	$7,840(+)	$11,990	$4,150	+$16,830
7	$7,840(+)	$11,990	$4,150	+$20,980
8	$7,840(+)	$11,990	$4,150	+$25,130
9	$7,840(+)	$11,990	$4,150	+$29,280
10	$7,840(+)	$11,990	$4,150	+$33,430
11	$7,840(+)	$11,990	$4,150	+$37,580
12	$7,840(+)	$11,990	$4,150	+$41,730
13	$7,840(+)	$11,990	$4,150	+$45,880

FIGURE 12

around 8 man hours for example after you know what you are doing). Many have been designed for the do-it-yourselfer; another way of saying they are not elaborately documented by the manufacturer and you are sort of on your own in the assembly process. This makes for a frustrating 'first time' but if you otherwise like an antenna (meaning you think it is worth the assembly effort) keep in mind that the first time you do anything, without much instruction, it always takes a long time to complete. You should inquire before ordering **any** antenna whether there are any instructions for assembly, how complete the instructions are, and, what instructions **and parts** are given for the in-concrete mount. While virtually all of the antenna sits above ground (typically) there must be some thought given to how you will attach it to the concrete pad or piers. Very few of the home antennas supply instructions for this and to the best of our knowledge none give hardware to fit **down into** the concrete. The ADM antenna, for example, will sit on the pad (or alternately three piers) at three spots. Each leg, as it sits on the concrete, has a flat plate that butts to the concrete and in each leg or foot there are two large holes. You can mount this antenna to bolts sticking out of the concrete by placing the bolts in the concrete so that they will align with the two holes in each foot pad. But **you'll** have to measure on **your** own the bolt size and make up **your** own in-concrete hardware **before** you pour the concrete. ('All Thread', a long bolt threaded over its full length and with no head is a simple hardware product that can be used to sink into the concrete.)

THE 'COMPLEX' TURN KEY

Not all customers will be satisfied with an antenna that can**not** be moved, by automated (motor driven) remote control, from their armchair. This is the high end or 'top dollar' buyer who will settle for nothing less than the very best system.

There is of course no realistic end to just how much money an individual **could** spend on a home system. I recall a wealthy man in Toronto who contacted me shortly after the initial (November 1978) **TV GUIDE** article came out. "I want one of these in my home" he said. I asured him that was possible but the expense might stop him. He assured me that price was no object.

"How many people can watch the same satellite?" he asked. Confused I assured him that he could wire up as many television receivers to the same satellite system receiver as he wished. "No, how can I watch one program, my mother another and my father another?" he asked again. I explained it would require three separate receivers; each of which would have to be adjustable over all 24 channels. I quickly explained how there are 12 channels on vertical polarization and 12 on horizontal and with some wiring cleverness each of his three receivers could independently look at or receive from any of the 12 vertical or 12 horizontal transponders. "Suppose I want to watch a program on SATCOM FI and my mother wishes to watch a program on WESTAR I?" he asked. I explained that would require some agreement between he and his mother since the parabolic antenna he had shown an interest in had to be moved from satellite to satellite. "Then I need two...no, three separate antennas". One for him, one for his mother and one for his father. He decided on his own that each would be motor driven, each would be 6 meters or twenty feet in size and each would have three receivers. We were now at three antennas, 6 LNAs and nine receivers.

"If the satellite picture looks so good, can I not use it on a projection TV system?". Again I underestimated the cash of the man. "Yes, but the projection sets available are really not that exciting (they were not **in 1978**)" I replied. "Well, I have a three level basement in my home and in the third level we have a movie screening room. Can I not install a projection system there?". I was beginning to get the picture. A large picture...this man was talking about a theater projection system such as one sees in use in closed circuit theater displays of fights and so on. It happened I had recently used one of the General Electric projection systems in conjunction with a cable TV seminar. "Well, the only unit I am aware of costs around $50,000 and I recently used one; GE had to send an engineer to run it **full** time and even then it was not very satisfactory" I offered. "There is a better unit available" he offered, "I have already inquired about it and it can be bought here in Toronto". I innocently asked what the unit was and how much it cost. "It was made by Phillips and I was quoted $350,000" he replied.

After the telephone call I sat adding up the numbers. Three earth terminals, all motor driven, nine receivers, six LNAs and the projection system. It topped $500,000. I decided he was out of my league. Several weeks later I heard from him again. "I am installing it now" he reported "can you put me in touch with some firms **in the US** who will install identical systems for me in my town house in Reno and at our villa in the Bahamas?". I did but kept muttering to myself that no-one could spend a million and a half dollars on television **reception**. I later commented to a friend "You can buy an INTELSAT A Grade uplink/downlink for an entire nation like Zaire for that kind of money!". Indeed you could.

Chances are not many people are in this chap's league. But to a smaller extend there are many people who have some loose 'change' and the same desires to have the **very best** of whatever it might be that is currently capturing their fancy. Which brings us to the $10,000 and up (way up) marketplace. We include in this manual a seven page addendum, reprinted from the (recent) October 1980 issue of **CSD**. The subject is 'private terminal marketing' and I commend you to read it along about here in your study of this subject.

Let's see how a $10,000 **up** terminal really differs from a less fancy system.

1) **Antenna** - these people want 9/10 grade pictures on **all** transponder channels. That may not include Canada's ANIK south of the Mason-Dixon line and it probably does not include reception from the INTELSAT or GHORIZONT birds in a 9/10 grade class. BUT - it does include flawless reception from both SATCOM birds, all three WESTAR birds and both the COMSTAR birds with television on them (D2 and D3). This suggests a minimum antenna size of 16 feet in any portion of the United States, 20 feet in many sections and 24 or even 30 feet in the Caribbean and south of Central Mexico.
2) **Mount** - the mount must be motorized with a simple-to-use remote control. These people want the push button ease of simply pushing a button and having their antenna track automatically to the bird of interest; or, to track from bird to bird pausing at each while they tune through the channels to see what is happening.
3) **LNAs** - while **most** home viewers are satisfied with a rotating feed system which must be turned (by motor remote control) to switch from vertical to horizontal or back again, the top dollar crowd wants instant, simultaneous reception from either polarization. That says the antenna feed must be equipped with an ortho coupler and twin LNAs; one for each polarization. Then into the house come two transmission lines, one for vertical signals and one for horizontal signals.
4) **Receivers** - with simultaneous reception possible from both polarizations, many of these buyers also want two receivers; one for each polarization.
5) **Monitors/RF Wiring** - since satellite receivers routinely deliver a video and audio output, most such installations will feature a good grade (such as Sony) video **monitor** at the receiving post so the viewer can watch the picture in its 'natural' baseband state. Two receivers, twin monitors. Then they wire on into an RF modulator which provides signal to as many other TV receivers on the premise as they care to serve. Since money is no object the modulators chosen are typically CATV type units with automatic leveling systems for both video and audio to insure that abrupt 'scene changes' do not disrupt the picture seen on a TV set connected to the system.
6) **Controls** - optionally, many such systems have remote control cabling spread throughout the premises so that by touching control switches installed in each room with a receiver the viewer can change satellite channels (although moving the antenna by remote control is usually left in a single location).

Can you do all of this for $10,000? Of course not. Probably not for $20,000 either. But between the real cost (perhaps $30,000 for the system outlined here; installed) and the $10,000 figure that separates the 'fancy systems' from the more mundane systems there is adequate opportunity for the seller to 'customize' the installation to suit the fantasies of his customer.

The real separation ground for fancier private terminals is the antenna. Usually the antenna is larger than most home terminals would install, and, **it is motorized**. Of all of the options set out, customers seem to prefer the instant-remote-control feature the most. Opportunities to view special programs such as championship fights and so on, only available on 'unusual' satellites (i.e. other than FI) clearly must be 'accessible' to these buyers.

The motorized mounts have been discussed in this manual. They exist, in limited quantities. **Many dealers have fabricated their own**, for their own use but they do not make them available as commercial products. To these dealers their own customized mounts, created for their own use, are an 'edge' against the likely appearance of home terminal system sales competition down the road. The only unit really available on a universal basis is that produced by Florida's AB Electronics.

What type of 'profit structure' can a 'fancy' private terminal expect? Many dealers working in this area are currently charging whatever the market will stand. Some are clearly over priced but then they have a waiting list of buyers so for as long as it lasts they will stay where they are.

Let's look at what such a '**basic**-fancy' system should cost you (the dealer) and then you can decide what it will sell for in the market.

1) **Antenna** - a 16 footer is the most common size. The Paraframe ET4.85 is popular for this service as is the AFC/Microdyne 5 meter antenna. Cost? Your cost in the $4,000 region plus freight.
2) **Mount** - let's assume the AB Electronics motorized polar mount equipped with the 12 position pre-set switch. Your cost, about $1650.
3) **LNA** - assume a standard 120 degree LNA at a cost of $650.
4) **Feed and antenna rotation system** - assume the Lindsay or Chaparral feed and a standard antenna rotor to turn from vertical to horizontal. Your cost, approximately $175.
5) **Receiver** - we won't pick out a particular receiver except to note that there are 24 channel 'commercial' (as in CATV) receivers available in the $3000 price range which are often employed. (Note: There are also $2,000 price range home style receivers **just now coming on the market** which may for many reasons become the 'standards' in this area)
6) **Modulator and RF distribution system** - most people like this want the satellite TV outlet in at least four rooms in their homes. This involves running low-cost (RG-59/U) coaxial cable from the modulator to several jacks positioned around the house. Typically at each TV set you install a 'regular TV/satellite TV' **switch** to select between the two signal sources. Count on spending around $250 here if you use one of the modulators sold to private terminal system users.
7) **Cables** - plan on spending $125 for the satellite TV cable and power cable to the LNA.
8) **Installation time** - expect to put in between 25 and 30 man hours on this job, at whatever your burdened labor rate may be.
9) **Promotion** - throw in a one year subscription to **SAT-GUIDE**, the monthly TV program for all of the programming services now on the FI satellite; your cost $36.

So, we have expended nearly $9,900 on this 'package'. Obviously it cannot sell for $10,000 but it could sell for $15,000 or even $18,000. And in many ways the buyer would be getting a 'good deal' at **either** of these price levels since equivalent installations in the commercial (CATV) world cost at least that much; **and do far less**.

SUPER DELUXE [BASIC] TERMINAL

1)	Deluxe Receiver	$3,000
2)	Twin LNAs * and ortho-coupler	1,700
3)	16' antenna surface, less mount	4,000
4)	Motorized mount with 12 pre-set controls	1,650
5)	RF modulator and 4 outlet wiring	250
6)	Cables	125
7)	Installation labor at $15 per man hour	450
		$11,175

* - or reduce by $950 and use single LNA plus rotator system.

FIGURE 13

PACKAGING THE PACKAGE

If you are reading this manual with the intention of investigating becoming a dealer in this business, you should by now be aware that there are not very many 'one-stop' sources for everything you will need. When you get right down to it, with the exception of some of the larger OEM's in the commercial field (i.e. Scientific Atlanta, Gardiner Communications Corporation) there is no such thing as a one-stop OEM. One firm builds antennas, another builds receivers, another sells LNAs.

In the home terminal field there is at the present time only a handful of firms who 'distribute' packages of equipment to dealers. Some of these manufacture some part of that package themselves while others simply buy in large quantites, stock (we hope) the gear and re-sell it off in smaller quantities.

H & R Communications (Starview Systems) started off as a firm manufacturing ten foot fiberglass dishes. They then expanded to selling complete packages of systems packaging ICM receivers (the original model 4200 no longer sold) and LNA units. Starview popularized trailer mounted demonstration rigs and equipped perhaps a hundred 'dealers' with these systems in their first year. More recently they have added a 16 foot antenna and have funded satellite receiver pioneer Robert Coleman to come up with a customized receiver for H & R to sell. In effect H & R has developed as something of a hybrid; an OEM for parabolic dish antennas and then a distributor for receivers and LNAs (they can be accorded the status of distributor because they in turn re-sell to dealers). And most recently an OEM-to-be for TVRO receivers. When the full history of this new industry is written it will also be recorded that H & R was the motivating force behind the mid-summer (1980) dramatic price drop in 120 degree LNAs. As H & R business grew they found themselves using LNAs in units of 10, then tens of units and finally as summer of 1980 approached 100 units (per month). This placed them in the position of wielding a big stick with LNA suppliers making them at the time perhaps the largest buyer of LNAs on a regular basis in the world(!). Since steady big quantities means a great deal to the LNA suppliers H & R soon found themselves in a position to take advantage of substantial price reductions for LNAs. The first time they found themselves using 100 LNAs in a single month they also found themselves able to negotiate pricing in the $550 per unit region. With 'wholesale/distributor' pricing in this region they in turn were able to drop single-lot pricing to under $800. From that point onward the whole LNA scene was never to be the same. With 120 degree units established at the 100 per month region in the $550 area it was soon evident that the choicer 100 degree units could be purchased in similar quantities for perhaps $200 more per unit. Other distributor outlets such as Vidiark Electronics (OEM for the 8-Ball antenna line of Sphericals) and AB Electronics (OEM for antenna mounts and a large dealer in high-dollar custom terminals for Florida and the Caribbean) found similar 'deals' for 100 degree units and even some 85 degree units.

For the LNA suppliers the private terminal industry was, by mid-1980, finally starting to amount to somethingThe most interesting point in all of this is that it only took an increase in volume from dozens of untis per month to a few hundred units per month to bring the LNA pricing down from the $1100 region (retail) to the $800 region. Many have suggested that a similar increase to a few thousand unts per month will again bring the pricing down by a similar amount. At the present rate of industry growth this suggests that by mid-summer 1981 LNA wholesale pricing may drop into the $400 area. At that point the 'cost' of the LNA will almost cease to be a major part of a system and one can project or anticipate that 'cost-cutters' in the industry will then turn their attention to other areas such as the antenna and receiver pricing schedule.

MARGIN vs THRESHOLD

When you have	To get 9/10 You Must
< 7	1) Repair something broken 2) Check antenna carefully 3) Double antenna size 4) Move to USA
7-8	1) More precisely align antenna 2) Check receiver performance 3) Upgrade to antenna 30% larger

FIGURE 14

Actually receiver pricing is capable of dropping almost as dramatically quite soon. The very basic satellite television receiver has been boiled down to the bare essentials already by Sat-tec and ICM with their $995 retail packages. These receivers can today be manufactured in 100-250 quantities per month for a total parts cost in the $250 region. And that cost factor **includes** one or two 'expensive parts' which continue to be artifically expensive primarily because of their short supply. What is this all about?

Inside a $995 receiver is a collection of dozens of parts each costing tens of cents each, a handful of parts each costing a few dollars each and one or two parts each costing between $60 and $100 each. Sat-tec has already designed an in-house replacment for **one** of these two high-dollar parts and both Sat-tec and ICM are hard at work eliminating the other high dollar part. On the assumption that both of these high dollar parts **can be eliminated** by mid-1981 the cost of parts in a low-end satellite TV receiver will cease to be a major cost-item for the total receiver. And that leaves us with the labor and marketing factors to contend with.

Marketing to date has consumed an abnormally low portion of the per-unit 'budget'; the industry has grown so fast that the demand has continued to exceed the supply by a large amount. So where many electronic devices intended for 'consumer purchase' may have a budget 'burden' of nearly 30% of full retail cost **assigned to the marketing function**, for now at least the marketing expenditure for satellite receivers remains typically in the

2-4% region.

The labor function is the remaining major stumbling block to exceedingly low cost receivers. Two types of primary labor add to the receiver's real-cost factor at the OEM level. As the unit goes through the assembly process there is a 'labor burden' attached to the selection of parts, the insertion or stuffing of parts into the circuit board (s), the soldering of the parts to the board, multiple stages of board inspection and then the final process of electronically testing the board or boards and adjusting the various sections of the receiver for peak performance.

Up to the point of assembled board inspection the labor factor is not significant. People employed in this portion of the assembly are typically at the lower end of the pay scale in electronics and the number of parts involved in the assembly to this point is not high by OEM standards. The final labor area, electronic testing (or test **and** alignment) remains today a high cost center area primarily because each receiver product requires hand 'tweeking' for peak performance. In this labor area the technician assigned to the task must employ a test equipment station variously valued upwards from $10,000 and because of his or her skills this is a (relatively speaking) top paying job. To the OEM, this particular function is a 'cost bottleneck'; a time consuming position loaded with expensive test equipment and a top paid employee.

The 'burdened cost factor' (i.e. the **total** cost per hour to the company to keep the technician on station operating a bench filled with expensive test equipment) can easily exceed $50 per hour. It is not unusual for a satellite receiver to stagnate in such a station for an hour or two. It is like having a taxi sitting around 'waiting for you'; the meter is always running. And the OEM has to build the cost of this 'running taxi meter' into the price **you pay** for his receiver product.

It is unusual for a product to have such a long 'T and A' (test and alignment) period. Most $1000 electronic gadgets do not require nearly as much T and A time as the satellite receiver does. So why do they?

Well, peak performance with a satellite video

TURN KEY INSTALLATION requires professional approach to every aspect of the system. The customer should approve antenna location and then "get out of the way" while you do the work. Avoid mistake of being too chummy with purchaser; keep it on a business relationship by doing your work carefully, getting paid, and leaving.

receiver only comes when **every part** of the receiver is operating to optimum alignment. There are typically between ten and 15 adjustments **within** a receiver that must be worked back and forth **each interacting with several other adjustments around it**. The technician turns an adjustment 1/16th of turn and then goes back and readjusts several other related sections of the receiver. Wrong way. So back off 1/16th in another direction and repeat the associated adjustments. **It is a process that simply takes time.** Additionally, each adjustment is affected by the parts that do **not** adjust in the circuit. And as Royden Freeland of ICM points out many of these small dime-cost parts are themselves outside of their specified tolerances and no amount of tweeking and tuning will therefore make **that particular segment** of the receiver align properly. At that point the whole receiver comes out of the T and A alignment station and goes back into a trouble shooting department where the out-of-tolerance part is laboriously isolated, removed and replaced with what they hope will be a part that is within tolerance.

So just as the very careful alignment of the satellite **antenna** (at the time of installation) can spell the difference between a grade 6 picture and a grade 9 picture, so too does the careful alignment and selection of parts for a satellite receiver have a major part in the final performance of the operating receiver. The truth here is really quite simple; microwave frequency range systems have a very low level of ''tolerance-for-error''. The ultimate picture quality is very much dependent upon **every** segment of the system performing at **peak** efficiency. There is virtually no margin for error **and this is no game for amateurs**.

Which brings us back to the question of packaging a system. If one is to assume that in any given system you may well not have peak performance from **every** part of the system (i.e. the antenna, feed, LNA, transmission line plus connectors, receiver) then we are naturally concerned about creating some type of **margin-for-error** in the system. And this brings us back to the antenna proper. The one area where the dealer can create **his own** margin-for-error is by purposefully selecting an antenna that is larger than needed to create 'on paper' a grade 9 or 10 picture in his region of the world. If a ten foot antenna is required for a Grade 9 picture in your area when one assumes that **every part of the system will be operating at peak performance**, the wise dealer will install a 12 foot region antenna **just as insurance** that when some part of the whole system does not operate at peak performance the installation will have some extra margin for 'error'. Are there not other ways to buy 'margin'? Yes, the LNA is one of these areas. You could, for example, elect to install a 100 degree LNA where a 120 would be adequate. But consider what it is you are doing first. A 100 degree LNA is slightly (let's say 'marginally') better than a 120. But any LNA is electronic, subject to both failure and its own 'as-aligned-peak-performance-criteria'. Are you wise to build in your 'margin' in a piece of equipment that may well fail, or degrade? Is it not wiser to build in that safety-margin with a segment of the system that is 'passive', not subject to failure or electronic degradation? I think so. And this gets us back to the antenna surface once again.

What about 'better grade' receivers? In the commercial field we have some $3000 range receivers which make certain claims for their 'threshold extension' capabilities. Is there something here?

The 'threshold' you will recall is a receiver performance measurement technique which determines just how much signal from the satellite antenna plus LNA the receiver must have to create a perfect (grade 9 or 10) picture. Some of the commercial receivers **claim** that by utilizing proprietary circuits they are able to reduce the threshold and thereby reduce the amount of satellite signal required to create such a 'perfect' picture. There is at least one receiver in the private terminal field (The Washburn Receiver) which makes a similar claim.

The concensus is that some of these receivers **do** make marginal improvements in the picture **but none are a substitute for** having more antenna delivered signal to work with. Our advice in this area is to 'sample' such a receiver and to make your **own** side-by-side comparisons before making a decision. After you see how it works, then compare the dollar numbers. Compare the difference in your cost for an expensive commercial receiver that provides marginal performance improvement against what the same number of dollars would buy for you in a slightly larger antenna. If the numbers are nearly the same then remember that the receiver is subject to failure, and no two of them will work exactly alike. That is, recall that receiver performance varies from unit to unit and depends upon the wide range of T and A talents at the OEM plus the **chance combination of parts** that lands in a particular unit. Bottom line? The antenna is **still** the best place to create extra 'margin' (see Addendum B with this manual).

SURVEYING THE SUPPLIERS

Numerous equipment suppliers have been mentioned in this Manual. And there are others, just as important perhaps, as well. Who are these people? What are their resources, and what can you expect from each?

Unfortuantely it is not always possible for you to become intimately acquainted with each of the potential suppliers and to know and understand their philosophies of business. So too is it not always possible for us to know and understand them. But in the course of getting this industry started we have had the opportunity to visit with many, either during SPTS events or in their places of business or through correspondence and communications. And we are on the 'receiving end' of hundreds of letters per month detailing others' experience with these suppliers.

What follows is **one man's opinion** of what we have learned about each during the course of our association with them. As you might suspect what follows must be very carefully prepared since we have an obligation to you to try to help you form your own business evaluation of each and a responsibility to the suppliers not to 'knock' them when they in truth do not deserve to be 'knocked'.

I do want it clearly understood that (1) **this is an editorial** opinion **of the writer**, and I clearly label it as such, and, (2) that **circumstances do change**, often quite rapidly and for this reason you need to keep tabs on the progression (or regression) of each through the pages of **CSD** monthly.

We will do this alphabetically, by both products and firm name so as to eliminate any 'favortism' in the manner in which they are listed.

ANTENNAS

The antenna manufacturers are by-in-large **systems people**. That means that they are usually quite astute about the **whole system** operation since the only way they can 'prove-out' their antennas is to be conversant and experienced with receivers and LNAs and cables and modulators. You should have at least one antenna manufacturer 'as a friend' since in your own formulative, learning days you'll need some help in figuring out some part of how this whole system works. Note that suppliers catering (willingly) to the 'private terminal' industry are in **bold face** print. The others will **usually** sell to you but may not really be interested in your business when they find out your installations are of a private nature (versus commercial).

A-B ELECTRONICS - 1783 W. 32nd Place, Hialeah, FL 33013 (305-887-3203). Contact Bob Behar. A-B was one of the first firms to offer high-dollar private terminal packages. They currently manufacture motorized polar mounts and are modifying Paraframe 5 and 6 meter antennas to their polar mounts. They also offer DEXCEL 85 and 100 degree LNAs as a distributor. Recently A-B got into planning and installing motel, apartment and condominium systems in southern Florida. The firm has extensive experience in selling and shipping goods into Central America, South America and the Caribbean. Bob Behar is a very hard working, capable businessman with a wide range of experience in television broadcast and two-way VHF-UHF communication systems. We rate them highly but caution you that Behar is impatient and quickly loses interest in you if you are not serious about doing business. Don't waste his time...he won't waste yours.

ADM - Antenna Development & Manufacturing Co. - P. O. Box 1178, Poplar Bluff, MO 63901 (314-785-5988). Jamie Gowen produces an 11 foot petalized antenna on a quasipolar mount. The antenna has 24 panel sections and comes complete with either a horn feed or Chaparral 'Super Feed' plus Alliance antenna rotator for vertical/horizontal changes. Gowen has one of the most successful antenna products going (shipping an average of 25 per week). They run a metal fabricating business turning out wood burning stoves and other products and have been at metal bending long enough to know what they are doing. Their antenna is well designed but requires some 'outrigger' supports to stabilize it against moving about in the wind. They provide a single stabilizer bar with each antenna but we have found using **two** bars is a better way to go. The panel sections fit together fairly well but we recommend that you use a aluminum plumbing tape (Type 807 Polyken Tape from The Kendall Co., Boston, MA) to strip over the 24 panel-fitting-gaps to insure that the antenna has a 'solid' surface. We rate ADM highly, Jamie is reliable and will bend over backwards to help you out. However, their experience is not in microwave and you cannot expect them to assist you in complex technical matters.

ANDREW Corp. (10500 W. 153rd Street, Orland Park, IL 60462). Andrew is one of the largest suppliers of sophisticated microwave frequency range antennas in the world. They have no concept of the private terminal market and their products are expensive. Their sales / engineering people are accustomed to talking with microwave engineers and as a consequence they may not be tuned in to 'your wavelength'.

ANIXTER-MARK (5349 W. Fargo Av., Skokie, IL 60076). Another firm heavily involved in big-buck, small quantity antenna markets. A-M has shown occasional 'interest' in the private terminal industry but apparently feels they are not equipped to handle the large volume of antennas required by this marketplace. This could change, but for now their interest is 'passive'.

COMM-PLUS - 3680 Cote Vertu, St-Laurent, Quebec H4R 1P8, Canada (514-337-7255). This firm employs a chap named Nelson Ethier who produced a parabolic antenna Manual for STT. Nelson is very clever with antennas and TVRO electronics and they have subsequently brought out a receiver, the Technimat Model 692A. Comm-Plus originally entered this field as a distributor of equipment (they were already distributing communications equipment in the Montreal area) and recently opened up what may be the world's first satellite TV retail outlet. They are supposed to be in production (in small quantities at this time) with a 10 and 12 foot parabolic antenna nearly identical to that antenna described by Nelson in his manual. They are working on a fancy petalized antenna system which they tell us will weigh a total of 150 pounds (antenna plus polar mount) and sell for approximately $1500 when completed. Our feeling here is that several very clever Canadians with great individual talents have gotten together here; but, there seems to be some lack of cohesive leadership and there is also probably a shortage of operating capital to bring off all of their projects in a timely fashion. Comm-Plus bears watching but for now they are not a major force in the business.

CHAPARRAL Communications - P. O. Box 832, Los Altos, CA 94022 (415/941-1555). Bob Taggart is a very clever mechanical engineer. He was involved with a Stanford University research project in the early 70's which created the first 'petalized' antenna for microwave service. Taggart in fact holds one of the few valid patents on petalized antennas. His antennas however have not done well in spite of the fact that they knock down into small packages and ship easily. We feel his problem is a lack of marketing and the physical appearance of his antenna system. It is more of a 'kit' than a finished product (all of the parts are there) and when you have it assembled it still does not 'look' complete. In conjunction with Taylor Howard Taggart has designed and marketed an antenna feed system they call the 'Super Feed'. Clipping along at several hundred per month the 'Super Feed' is going as well as the antenna line is doing poorly. Somebody with some bucks needs to take Taggart's antenna system into full production adding some cosmetic touches to give it a finished look. Taggart is a straight forward sort with a brilliant mechanical mind.

COOP'S ESTIMATE OF MONTHLY HOME TERMINAL HARDWARE MARKET
November 1980 and November 1981

	1980	1981
1) **Receivers:**		
A) Number Units	350	800
B) Dollar Value	$385,000*	$800,000*
2) **Antennas:**		
A) Number Units	250	650
B) Dollar Value	$350,000*	$975,000*
3) **LNAs:**		
A) Number Units	300	675
B) Dollar Value	$180,000*	$371,250*
4) **Modulators, Support Eqpt.**		
A) Number Sys. Units	150	550
B) Dollar Value	$33,750*	$123,750*
5) **Special [Motorized] Mounts**		
A) Number Units	15	150
B) Dollar Value	$30,000*	$255,000*
Monthly Value	$978,750	$2,525,000

* - At wholesale (OEM) level

FIGURE 15

Gardiner Communications Corp. (SCI division included; 1980 S. Post Oak Road, Suite 2040, Houston, Texas 77056). This firm has been in and out of the private terminal business several times. They showed up at the initial SPTS '79 with a booth pushing a prototype low-dollar receiver, their SCI LNAs and antennas. At SPTS '80 Miami they appeared with a program designed to create dealers for their full product line and pushed their SCI LNAs. They were scheduled to exhibit at SPTS '80 San Jose but backed out at the last moment following a corporate policy change that elected not to participate in the private terminal market. Approximately ten of their dealers are functioning however and they continue to sell **some** product in this area. Their antennas are expensive but doing well in the commercial field. The SCI division LNAs and receivers are reasonably well regarded. There was a period when a broken SCI LNA would get factory repaired in a 24-48 hour turn around but recent experience was six weeks (!).

H & R COMMUNICATIONS - Rt. 3, Box 103G, Pocahontas, Ark. 72455 (501/647-2001). John Hastings, Virgil Richardson and Randel Odom are 'the success story' of the private terminal industry. Attending SPTS '79 as delegates they became convinced this was a business they wanted into. Their first ten foot dish was 'molded' from a dish that pioneer Robert Coleman had in his yard in South Carolina. Their first 16 footer came off another Coleman 'surplus' antenna. From that inauspicious beginning H and R has become the largest volume distributor of private terminal products in the business today. They offer trailer mounted rigs for demo, various antennas sizes and some clever mounts. They broke the LNA price barrier by being the first to offer 120 degree units in quantities of one under $800. In spite of all of their success (or perhaps because of it) they are having a few growing pains. Their sales efforts keep them jumping to find sufficient receivers to supply to their dealers and others who buy from them; they use ICM and Com-Tech and Microdyne receivers and have been working with Robert Coleman to develop a pair of receiver products which they will license out for manufacture. One is a standard 24 channel format with lots of user bells and whistles (the ultimate Coleman receiver) while the other is an antenna mounting receiver with all of the electronics at the antenna feed. Their fiberglass antennas appear to be well made although we have heard reports from a dealer or two who were not happy with some of the workmanship. These are very hard working people determined to be a big success in this new field and they appear adequately financed. But they are doing superhuman things to stay up with the demand and you may have to stay close to them to get your deliveries on schedule.

HUBBARD-PAYNE - Suite 113, 4811 Clinton Highway, Knoxville, TN 37912 (617-688-6261). Ralph Payne brought a very interesting looking 14 foot antenna system to SPTS '80 San Jose but apparently had mixed reactions to the product and pricing. Payne operates a telephone equipment supply company and the approach to the 14 foot antenna size was we felt well thought out. His exact status at this writing is unknown however and we suggest you check directly with them.

Hughes Microwave Communications (3060 W. Lomita Blvd., Torrance, CA 90505). This is one of those giant sized conglomerates that starts off by building satellites (the WESTAR and ANIK I, II and III series for example). They have a high quality and expensive line of TVRO antennas, receivers and LNAs (probably not of their own manufacture). They have shown **no interest** at all in private terminal hardware although one of their many divisions was involved in 1979 in the development of a proto-type $1000 home earth terminal for NASA under contract. They did it alright...but **not** for our present 4 GHz band; rather it was for late 1980's use of the next higher band; 12 GHz.

LULY & ASSOCIATES - P. O. Box 2311, San Bernadino, CA 92406 (714-884-9010). Bob Luly appeared at SPTS '80 San Jose with his 'Umbrella Antenna', a fold it up and collapse metalized mylar antenna system that weighs just 12 pounds for a ten foot version and 15 pounds for a 15 foot version. The antenna was an instant success and nearly 100 people placed deposits with Luly for the antenna. Luly operates a very successful sound system company and he is no newcomer to electronics or microwave technology. Like so many others now in this field he started out with a homebrew system and became intrigued with the limitations of the system. He felt that the large antenna was an impediment to the quick growth of terminal systems and decided to create an antenna that a dealer could easily stock. Several 'big buck' people tried to talk him into allowing them to fund his operation at San Jose and Luly went along with one of these. This cost him the balance of July, all of August and most of September. He finally determined that his 'arrangement' with big bucks was not getting him into production so he started anew late in September to get his act together. We judge Bob to be very bright, a good businessman, but he has been a victim of his own success to date. We give him good marks in everything he has done and feel he will solve his production problems shortly.

LINDSAY SPECIALTY PRODUCTS CO. - 50 Mary Street W., Lindsay, Ontario K9V 4S7 Canada (705-324-2196). John Thomas has been manufacturing heavy duty CATV antennas in Canada for more than twenty years. He also manufactures antennas in Australia (under license) and aluminum lawn chair furniture as well as some electronic hardware for the CATV industry. His line of TVRO antennas is quite new (first seen in Miami; modified in San Jose and expanded later to three models covering 10, 12 and 15 feet in size) and we would not be surprised to see him add some electronic items to the antenna plus his LS9-35 feed system shortly. John is a tough, frugal businessman with lots of savvy. His experience with non-Canadian markets makes him a tough competitor in off-shore areas but he may have some difficulty being competitive in the USA; time will tell. His products are never inexpensive but typically they are very well made and strong. John gets high marks but we suggest you wear your negotiating shoes when dealing with him; John seldom comes out on the short end!

Microdyne Corporation (including AFC antennas; 491 Oak Road, Silver Springs Industrial Park, Ocala, FL 32670.) This firm is an inigma. They have a substantial 'chunk' of the commercial business and have been **tempted**, several times, to get directly into the private terminal business. Early in 1980 they privately demonstrated a special private terminal package which places virtually the whole LNA plus receiver at the antenna. H & R, a distributor of their commercial receivers, felt they was going to be the distributor for that product but subsequently Microdyne decided to not allow H & R to have it. Microdyne's official 'position' is that they are not interested in nor will they sell to the 'private' or home market; a posture created by their desire not to offend the cable TV marketplace (see Addendum 'A' here). For now the firm is not in this business but you'll have no difficulty buying their product if that is what you want.

Microwave Associates (63 Third Avenue, Burlington, MA 01803; Atten. J. Duke Brown). 'MA' (as they are affectionately known) is another enigma in this field. A large microwave product conglomerate with many resources, the firm has been a 'minor-major' factor in the commercial field. Several detailed studies have been done by people inside the firm and outside to develop a marketing program for 'private terminal systems'. A small amount of hardware has been supplied to a couple of dealers in the field and they appeared at SPTS '80 San Jose to look for some '**professional**' marketing outlets. MA is a very aggressive firm with a good image. As they gradually get into the private terminal business (they now manufacture receivers and through recently acquired Prodelin, antennas) they are interested in forming sound, business relationships with well funded, experienced marketing groups. These are the big boys playing hard ball; **if you qualify to play with them,** you'll be in the big leagues.

COOP'S ESTIMATE OF PRIVATE TERMINAL RETAIL MARKET AT RETAIL DOLLAR LEVEL
November 1980 and November 1981

Category	Do-It-Yourself Market	Turnkey Market
November 1980	$225,000	$1,501,500
Total Per Month Market	-	$1,726,500
November 1981	$275,000	$3,838,000
Total Per Month Market	-	$4,113,000

FIGURE 16

MICROWAVE GENERAL - 2680 Bayshore Rd., M.S. 210, Mountain View, California (415/969-3355). Chuck Colby is essentially a 'packager' of hardware and his firm supplies high dollar systems to west coast buyers. He probably does a better job at it than anyone else in the business at this time. To package his systems he builds some antenna hardware or markets same in his company name having it built for him elsewhere. Nothing Chuck sells is inexpensive but it works. He **might** be talked into selling you, for your own re-sale, various items from antennas (up to 16 feet), low-profile antenna mounts, azimuth over elevation antenna positioning systems (including readouts) and a line of special feeds. One item Chuck handles which is often hard to find when you need it is the ortho-coupler that goes on the antenna when you want simultaneous reception from **both** vertical **and** horizontal channels. Chuck gets high marks for what he is doing but it is questionable whether he really wants to sell materials to others. Try and see.

MINI CASAT - Rt. 3, Box 160, Fulton, MS 38843 (601/862-2132). This firm produces a 10 foot reflector **surface** which they sell for $680 in lots of one and for $585 in lots of 10. You have to round up your own mounting system (plans of a sort are provided) and feed. The f/D of the surface is .4 which means you could put the Lindsay or Chaparral feeds on it. You'll have to build your own feed support strut system however. By the time you get done adding a feed, feed support struts and a mount (even a simple fixed mount) the 10 lot price of $585 will probably be closer to $850. Little is known about the performance of this antenna system nor about the firm.

NORSAT SYSTEMS - Box 232, Surrey, B.C. V3T4W8, Canada (408-667-4247). This is an 'apparent' sad story. Rod Wheeler is the premiere figure in NORSAT. Wheeler was the first person to have a private terminal in Canada (see **CSD** for June 1980) and he knows the business very well. He has been trying to market a wooden parabolic lined with a metalized paper material (thereby creating a reflection surface) for about a year. He offers plans for same (expensive) plus kits (not cheap). He also offers LNAs (imported from the states) and receivers. We have had several letters from people who have sent money to NORSAT and who have not received what they ordered. We have attempted to discuss this with Rod and he was scheduled to attend SPTS '80 San Jose as an exhibitor. He did not show up. For now we can**not** advise you to deal with them. Maybe they will straighten out soon; we hope so.

PARAFRAME - P. O. Box 423, Monee, IL 60449 (312/534-7435). Jim Vines started this company back before there was a private terminal industry. Fascinated with what was happening with commercial TVRO terminal pricing in 1977 or so Jim set out to get his product ready for what he thought was going to be a big market. Jim got intrigued with something called a 'stress parabolic' which is created by taking some really good quality wood and putting it to a stress (by bowing it). This sounds kind of primitive we admit **but the way Jim does it is elegant**. In fact his various dishes are probably the **strongest** antennas available in the private field and they give the commercial dish people a good run for their money. Jim had a few problems with his first units; he has had a continuing problem with his sub-suppliers. In spite of his problems Jim turns out a quality product but it is not inexpensive. He works hard and long and is a long way from making money himself. His firm is under capitalized and of late he has been investigating packaging a receiver with the Paraframe name on it. Jim is very knowledgeable, shares his knowledge freely and probably is a soft touch. He has a good head for marketing but in our opinion needs someone in there to run the business profitably. His delivery will be timely to slightly slow and he wants a deposit in front. You can best gauge your own delivery from him by listening **carefully** to him; he'll tell you **when** he can realistically deliver and if you write that date down **without trying to push him** to commit to deliver sooner, you'll be OK.

RMS/Harris (P. O. Box 1277, Kilgore, Texas 75662). This is an expensive line of commercial antennas. They are pros but don't like dealing with people who are not professionals. RMS started out as an independent supplier of antennas, was bought out by Harris which is a large electronics conglomerate that currently does produce a line of high dollar (and high quality) satellite receivers for the commercial trade.

Scientific Atlanta (3845 Pleasantdale Rd., Atlanta, Georgia 30340). SA is the big one in the field (see Addendum 'A' here). They do not want to hear from you unless you are selling commercial terminals (which in all fairness does include hotels/motels and apartment units). Everything with an SA label on it costs a bunch of money. They manufacture antennas from 3 meters to 10 meters, a couple of receivers, modulators and their own LNAs. They are frightened to death by the home terminal market but down deep they would love to be in the business. So in time they may well be; for now, they are not.

STS OF MISSOURI - P. O. Box 1181, Poplar Bluff, Missouri 63901 (800-325-0761). This firm first displayed at SPTS '80 San Jose and they brought with them a 10 foot petalized antenna that made a big impression because it had a well tuned 'finished look'. Since San Jose they have been pushing their antenna's 'Good Looks' and have been trying to set up a network of dealers and distributors. Like many antenna manufacturers, they wanted to handle a line of receivers as well; under a proprietary name brand basis. Danny Hogg spent time trying to get this going after San Jose but there are just not that many receiver suppliers around and product is short. STS also has a 13 foot solid dish antenna,and they offer trailer mounted rigs for dealers and a fairly comprehensive dealer program. At the moment they seem to be having 'start-up-blues' but we expect they will get these problems straightened out soon. What they need more than anything else is to be shipping lots of antennas.

SATELLITE TELEVISION SYSTEMS / STAR - P. O. Box 51837, Lafayette, LA 70505 (last known telephone number is 318/234-2495). They made a big hit at SPTS '80 Miami and then got into trouble. There were some battles over who owned and controlled the company, and how it was going to be run. When they next appeared at SPTS '80 San Jose the most visible person at Miami was not involved with them. Since San Jose little has been heard. They displayed at San Jose a very good performing 13 foot dish with a motorized polar mount. It was priced fairly and it looked like it was the 'proper size' for most **serious** home installations. The motorized mount made it very desirable. What they are doing today and what has happened to the product remains something of a mystery.

SWAN ANTENNA COMPANY - 2202 Hollywood Drive, Stockton, CA 95210. When Oliver Swan died in December of 1979 there was a battle within the family over who would continue Oliver's work with the Spherical antenna. Prior to his death Oliver's brother **Henry** had (with Oliver's help) established a small manufacturing facility in Stockton, California. Meanwhile Oliver's widow was trying to complete arrangements with a major antenna manufacturer (Gardiner Communications Corporation) to be licensed to build the antenna in both the commercial and private terminal area. At SPTS '80 San Jose Henry Swan appeared in conjunction with another California firm (TCI) to display his five meter version of the Swan Spherical. The antenna worked very well and was very well built. However some may find the pricing steep. Henry's problem is that he is too high priced for the **private** market but too low priced (and therefore has no creditability) for the commercial

COOP'S PERSONAL RATING OF HOME TERMINAL ANTENNA SUPPLIERS

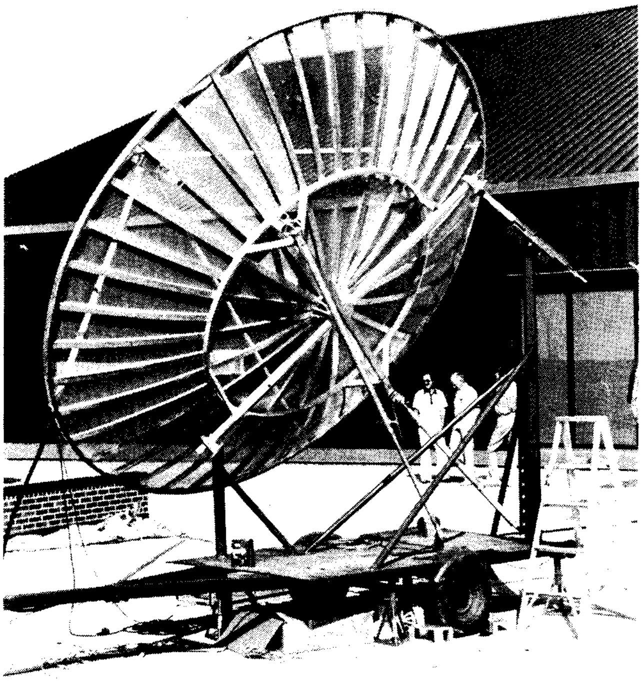
Company	General Knowledge of Field	Specific Knowledge of Product	Delivery Ability	Back-Up Support	Product Integrity	Commitment To Excellence
A-B Electronics	9	8	5	5	8	7
ADM	7	9	9	10	9	7
Comm-Plus	9	10	5	?	?	?
Chaparral	8	10	?	?	?	8
H & R	9	8	7	7	7	7
Luly & Assoc.	10	10	?	?	?	9
Lindsay	9	10	8	?	9	9
Microwave Gen.	10	10	?	?	10	10
Mini-Casat	6	7	8	?	?	?
Norsat	9	9	4	4	4	5
Paraframe	9	10	7	10	10	10
STS / Missouri	7	8	7	?	9	8
Star	6	7	?	?	8	9
Swan	6	6	?	?	8	7
Vidiark	10	10	9	10	9	9
Wagner	?	8	?	?	?	?

FIGURE 17

market. The Henry Swan version of the Spherical needs more exposure and it may well be the sleeper antenna product in the field. For those who might be motivated to deal with Henry, be prepared. His background is accounting and he is difficult to talk with.

USTC - United States Tower Company (P. O. Drawer 'S', Afton, Oklahoma 74331). In spite of their considerable success in the commercial field the people who own and run USTC are good guys with their feet on the ground. But they are not very anxious to do business with private terminal sellers **at the moment**. USTC made a big name for itself building elaborate tower systems throughout the USA and moved into satellite antennas with a six meter dish. In fact the first home terminal in the US, at Coop's Oklahoma place, was a USTC six meter dish. USTC has a line of dishes from 13 feet to 20 feet and they recently came out with their own line of 'stackable spherical sections'; each is 8 foot by 10 foot and you buy as many as you need to form the size Spherical you need. Some really big ones (60 foot plus) are going into deep Mexico for cable use there. Yup, they are expensive when they get this big; in the $150,000 class. USTC still does have a small handful of 'dealers' who sell their products (dishes primarily) and if you can get the attention of Danny or Stormy Weathers you'll have a good suplier. For now their interests are elsewhere.

VIDIARK ELECTRONICS - P. O. Box 57, Salem, Ark. 72576 (501/895-3167). When Hayden McCullough attended SPTS '79 in Oklahoma he found much in common with Oliver Swan. He left Oklahoma determined to work with Oliver in the **additional** development of the Spherical. With Oliver's death Hayden was left on his own and he brought out a line of Spherical antennas from 6 feet to 15 feet. At SPTS '80 San Jose the Spherical attracted lots of attention because it worked, was cheap, and most people felt they could identify with the way it works. McCullough now has a lively business going building up Sphericals (primarily 12 foot size since that seems to be the most popular) and shipping them all over the world. His antenna is a kit of sorts because you do assemble but he provides a good manual to guide you through it and after you've done **one** the rest are a snap. His prices are fair, his delivery is good and he is a knowledgeable person who will help you through whatever problems you create for yourself.



WAGNER INDUSTRIES - Box 559, Alva, Oklahoma 73717 (405/327-1877). They began advertising a line of Spherical antennas in June, appeared at SPTS '80 in San Jose (without an antenna) and then disappeared. We don't know what happened to them.

If we have forgotten any antenna suppliers we apologize in front. As you can see there are many of them out there in various stages of development.

LNAs

You really don't have much choice when you are buying LNAs. For all practical purposes there are but four firms in this field although their products do show up through distributors now. As noted earlier, most of the LNA suppliers (two of the four) really don't want to hear from you unless you are ordering some reasonably large quantity (such as 25 at a whack although you **might** get an order processed for ten units).

AMPLICA, INC. - 950 Lawrence Drive, Newbury Park, CA 91320. Amplica is a well funded, professional supplier of microwave hardware. They were offering 120 degree LNAs through distributors such as AVCOM early in 1980 but otherwise keeping a low profile. When AVANTEK dropped the price so that H & R could offer single lots for $795 AMPLICA was both surprised and shocked. They first vowed they would not lower the price but as in most competitive situations they did. Now they offer 100 degree units in 25, 50 and 100 quantity lots at very competitive pricing. Talk with Jim Cole.

AVANTEK, INC. - 3175 Bowers Avenue, Santa Clara, CA 95051 (408/727-0700). This firm participated heavily in SPTS '80 Miami and assured us all that LNA prices were **not** going to drop below $1,000 in 1980. By June AVANTEK LNAs were available for under $800 and since then the price has dropped even more. Dealers buying 25 can think in terms of $650 each and if you go for 100 units at a whack $550 range pricing is the order of the day (120 degree units). 100 degree units are also available. In small quantities you can buy from H & R. Talk with Kenneth McKean.

DEXCEL, INC. - 2285-C Martin Avenue, Santa Clara, CA 95050 (408/727-9833). This firm was at the first SPTS with a booth and they haven't missed one since. Initially they only offered 30 dB gain LNAs in the 120 to 150 degree range but they have subsequently brought out units as low as 85 degrees Kelvin and through AB Electronics in Hialeah they now have both 85 degree units and 100 degree units available. Art Kawai is the fellow to talk with and you'll find them good people to deal with.

SCI (Division of Gardiner Communications, 1980 S. Post Oak Rd., Suite 2040, Houston, Texas 77056). SCI was the first firm to show an **interest** in selling LNAs (and later receivers) to the private terminal market. SCI was purchased by Gardiner in 1979 and there have been many changes since that sale. SCI manufactures a good line of LNA units but they have not been responsive to the price drops of AVANTEK, AMPLICA and DEXCEL during the past few months. You can still buy a single unit here however and they offer 100 degree and up units routinely with special units available (at big prices) below 100 degrees. You will probably find off-the-shelf delivery possible for a single unit. Talk with Wally Briscoe.

RECEIVERS

Ah yes. The receiver. Well, it has gone through a lot to get where it is. As reported in the June (1980) issue of **CSD** the first real private terminal receiver came along in 1978 but the first units to be marketed (AVCOM and ICM) were not available until the SPTS '79 show in Oklahoma in August of 1979. What has happened since is detailed in Adendum 'B' in this manual.

AVCOM OF VIRGINIA - 10139 Apache Rd., Richmond, VA 23235 (804/320-4439). Andy Hatfield got seriously interested in building receivers in the fall of 1978. He was employed in the computer field at the time but was running a small mail order equipment house for amateur operators. His first receiver was displayed at SPTS '79 and from the reaction to that display Andy gave up after ten years at IBM and entered the field full time. He has not been sorry. AVCOM turns out a high quality product carefully overseen by Andy every step of the way. The receiver is priced slightly lower than commercial receivers and works every bit as good (slight variations from receiver to receiver aside). The initial unit had a clever scanning circuit which allowed you to make the receiver 'scan' electronically through the channels while you aligned the antenna or were otherwise occupied. The first model didn't have a fantastic cosmetic appearance but when Andy brought his product line to SPTS '80 San Jose he had added some very fancy looking 'coachwork' to the product which in our estimation makes it look like a high grade piece of satellite hardware. The current model includes a remote control box and also can be interfaced with an appropriate antenna positioning control for automatic change over from vertical to horizontal polarization. Andy will not be rushed; he turns out only as many receivers per month as he can comfortably personally oversee and align and there

COOP'S PERSONAL RATING OF HOME TERMINAL LNAs AND RECEIVERS

Company	General Knowledge of Field	Specific Knowledge of Product	Delivery Ability [Small Quantities]	Delivery Ability [Large Quantities]	Back Up Support	Product Integrity	Commitment To Excellence
Amplica	6	10	5	9	9	10	10
Avantek	8	10	5	9	9	10	10
Dexcel	9	10	8	8	10	10	10
SCI	6	10	8	7	7	9	9
Avcom	10	10	10	5	9	9	10
Comm-Plus	8	10	?	?	?	?	10
H & R	9	9	?	?	?	?	?
ICM	10	10	8	8	9	8	9
Icon	8	10	?	?	?	?	?
KLM	6	8	?	?	?	?	8
Ramsey	10	10	8	8	9	8	9
Rohner	10	8	?	?	?	?	?
SATRX	7	7	?	?	?	9	?
Sat Sup	7	7	?	?	?	?	?
TCI	7	9	?	?	?	9	9
Washburn	10	10	?	?	9	?	10

FIGURE 18

is a chunk of Andy in each radio that leaves Richmond. He has dealers and supports them with product. Getting 'into the club' may be difficult; you have to qualify.

AB ELECTRONICS - 1783 W. 32nd Place, Hialeah, FL 33013 (305/887-3203). Bob Behar has been 'toying with' bringing out his own receiver for some time. He demonstrated one in Miami at SPTS '80 there but a close inspection of it revealed that it was essentially an ICM unit re-packaged. Bob has the talent around to do it but for now he seems to have other projects occupying his time.

COMM-PLUS - 3680 Vote Vertu, St.-Laurent, Quebec H4R 1P8, Canada (514/337-7255). This is the receiver Nelson Ethier brought with him to display at SPTS '80 San Jose. The unit in California didn't work very well but that was understandable; someplace between Montreal and California the baggage handlers played football with it. The receiver has a very attractive look, and if you listen carefully to the way they tell you it is designed and built you are impressed. Their ability to produce it in **quantity** (it will take at least 50 per month out the door for them to have **any impact** on the marketplace) and their ability to produce a quality product time after time has yet to be proven. They do offer an attractive schedule for dealers ($1995 list with US dealers paying around $1250 to $1300) and the features are outstanding. Stay tuned.

Farinon Electric (1691 Bayport Rd., San Carlos, CA 94070). They manufacture a line of high-dollar receivers and even consider the cable TV 'commercial' market as not worthy of their time. They are not likely to get interested in the private terminal market.

Gardiner Communications Corp. (see listing for antennas and LNAs).

H & R COMMUNICATIONS - (see listing under antennas). They are working on a pair of receivers with pioneer Robert Coleman. A 24 channel tuneable unit will feature scan tuning, metering, multiple audio sub-carriers and lots of 'bells and whistles'. It will have a list price in the $2,000 region. An 'everything-at-the-antenna' receiver (simple cable comes inside with the picture and sound) will be sold as a part of a 10 foot antenna 'package'. Contact them for details and the latest delivery information.

Hughes Microwave (see listing under antennas).

ICM - INTERNATIONAL CRYSTAL MFG. CO. - 10 North Lee, Oklahoma City, OK 73102 (405/236-3741). ICM has been producing satellite receivers since SPTS '79. Their initial unit, model 4200, was designed by H. Paul Shuch, California microwave designer. Prior to ICM producing the unit Shuch offered a few modules (but not a complete receiver) and there is a small quantity of Shuch 'receivers' around as well. ICM's $1995 4200 was superceded by their 4300 at SPTS '80 San Jose. This 24 channel tuneable receiver has provision for up to six audio sub-carriers, automatic fine tuning (AFC), two audio outputs (stereo is possible with an option) and a video output. You need an external modulator. For $1149 (options added) you also have a hand held remote control package that tunes in the channels and it can be wired to any room in the house with a simple three wire cable. ICM has a large, modern production facility, has prior experience in microwave hardware (ovens) and large quantities of wired and tested products (CB radios et al). The firm is one of the largest manufacturers of high quality quartz crystals in the world having been established in 1946. ICM currently turns out more than 100 TVRO receivers per month, is likely to have their output to the 200 range by the first of 1981, and is a good prospect to be producing under contract receivers for other manufacturers such as SATRX. ICM discounts for volume purchases, is tough on credit and if you run a straight operation yourself you'll appreciate Royden Freeland's brand of business.

ICON ELECTRONICS - 333 McPhillips Street, Winnipeg, Manitoba R3E 2K9, Canada (204/284-1703). Willard Elliot appeared at SPTS '80 San Jose with an interesting receiver system; **dual** receivers built into a single container. They shared a common power supply and in theory you could place one on a vertical feed and one on a horizontal feed on one antenna, or alternately tune both to different transponders on the same polarization. This is a Canadian product, possibly intended largely for sale within Canada. Since San Jose we haven't heard from Willard but were impressed with his quiet, matter-of-fact approach to the business.

KLM ELECTRONICS - P. O. Box 816, Morgan Hill, CA 95037 (408/779-7363). KLM has come along subsequent to SPTS '80 San Jose although if you looked closely there you could spot the proto-type of their receiver. A chap named David Barker of Phoenix, Arizona had a single conversion 'image-rejection' scheme receiver at San Jose; having written up this technique in the June (1980) issue of **CSD**. Barker's approach is valid and it offers reasonably high quality pictures without many of the ills of the (in)famous PLL system. KLM cut a deal with Barker and rushed the receiver into production. KLM is well known in the VHF-UHF communications field with an extensive line of two-way transceivers, amplifiers and a big line of antenna systems. The new 'Sky Eye I' receiver carries a list price of $1295 and they are interested in dealers. It has continuous audio tuning from 5.8 to 7.4 MHz sub-carriers and two-piece construction with most of the receiver mounted at or close to the dish. This eliminates the expense of large cable to get from outdoors to indoors. Now - how well does it work? We have not seen one yet and cannot say. We know Barker had a valid approach worthy of investigation and this product **could** turn out to be a major force in the marketplace. But like anything else new they need to get into shipment, in quantity, and we all need the opportunity to see how well it performs.

Microdyne Corporation (see listing under antennas).

Microwave Associates (see listing under antennas).

RAMSEY ELECTRONICS (Sat-tec) - 2575 Baird Rd., Penfield, N.Y. 14526 (716/381-7265). John Ramsey is one of the most creative people in this young industry. John first appeared as 'the source' for kits and wired and tested units for The Washburn Receiver, popularized by Clyde Washburn and a subject of an STT manual this past February. Unfortunately Ramsey and Washburn could not get along and their joint product/project ground to a halt before more than a half dozen of the Washburn units were delivered. Ramsey then decided to bring out his own line of receivers and he announced a $995 receiver (Sat-tec R2) early in June. This receiver proved to be a love-hate product. Some people (us included) loved it; others found it lacking in performance. Subsequent investigation suggested to us (as reported in **CSD** for July, August, September and October) that **many** of the R2 problems were being caused by either sloppy alignment and/or shipping difficulties (getting the receivers knocked about caused mis-alignment when they were received). Ramsey subsequently has come out with an **R2A** version with a considerably improved detector circuit. He is also ready to announce, as this is written, a more elaborate receiver employing a 'conventional discriminator'. Ramsey is capable of turning out between 100 and 200 receiver units per month. His firm has been manufacturing electronic frequency counters and other test equipment for several years and is generally well regarded. John is young, very hard working, and he is not so proud or filled with ego as to impair his good judgement. If Ramsey supplies you with a piece of equipment and it turns out bad, you'll get fast service to get it replaced or repaired. They aren't perfect yet...but their attitude is tops and they are trying.

ROHNER & ASSOCIATES - 501 N. Elm, West Liberty, Iowa 52776 (319/627-4819). This one is a problem. John Rohner is a bright microwave engineer (if he isn't then a lot of us have been fooled). But someplace between his brilliant mind and his shipping desk there is a foul-up. Rohner announced a $1500 satellite TV receiver **PLUS** LNA combination last May (1980)., Everyone took notice. He promised to show it in San Jose. He didn't and that started the rumors. After San Jose he told us he was being held up by not getting some aluminum castings (they were to house the outdoor portion of his unit). Later investigation by several people indicated that housings may not have been the problem. Rohner asked for and accepted deposit checks for his receiver at San Jose and subsequently; most people we talked with as late as early in October told us the checks had not been cashed. But they had no receiver either. Rohner in September became very difficult (if indeed even possible) to get ahold of and the rumors flew even faster. At this writing the last official word we have heard is that the price has risen from $1500 to $2500. We still have not seen one of the receivers. At any price. And we don't know of anyone else who has either; as of October 15. It was a great idea...but as always the proof was to be in the performance of the unit and Rohner's ability to ship. Neither have happened yet.

SATRX - 250 Kawaihae Street, Mt. Terrace (Suite 8-A), Honolulu, HA 96825 (808/377-6195). Barney Phillips appeared at SPTS '80 San Jose with a nifty little satellite receiver with a hand held (wired connected) remote controlled receiver. It worked very well. An inspection inside revealed that unlike most other receivers, this one was constructed on a single 'PC' board. Closer inspection revealed the receiver had a very interesting detector circuit. Phillips has a long, apparently successful history, in the electronics business. He was involved in the 8 track audio tape recorder development and business and when Earl Muntz went out of business in the 8 track field Phillips bought out the failing Muntz line. He initially produced 20 of the units and from contacts at San Jose carefully allowed various would-be dealers to field test them. Many found they worked very well; at the $1250 range retail price quoted.

Most recently ICM's Royden Freeland was asked to quote on building 50 of these receivers per month, on a job-shop basis, for a year (600 total) with options to increase the production to the 100 and up range. Phillips apparently wants to be a **marketing** company, not a production company and in choosing ICM to bid on their manufacture he was selecting a firm he felt could handle the work.

Freeland rates the receiver performance as very good and he is especially impressed with the construction format which lends itself (perhaps more than any other receiver design) to rapid production and quick alignment and tune-up. **IF** the SATRX unit gets into volume production an **if** Phillips does back it up with an aggressive marketing program, dealers associated with him could have a winner here. But that's a lot of IFs for right now.

SATELLITE SUPPLIES - Box 278, Aldergrove, B.C. VOX 1A0, Canada (604/859-6315). This is another one of those **IF** stories. After SPTS '80 **Miami** Taylor Howard was hired to design a 24 channel tuneable satellite receiver for manufacture in Canada. Satellite Supplies was a new venture formed by some professionals from the Canadian cable TV marketplace who felt that the satellite field was going to be a big one. Tay sat down and designed a receiver unlike any other to date; most of all it got rid of the very costly, and hard to get 'VCO' unit plus the short-of-supply 'double balanced mixer'. In effect, Tay eliminated any parts which would hold up production for artificial reasons.He sent several of the new units in prototype form to Canada in May of this year. The finished product was to have been shown in San Jose. It was not. During the balance of the summer the receiver underwent major surgery, not all of it happened with either the blessing or the input of designer Howard. Late in September the receiver was reported to be headed for an initial production run of 100 units; the hard to get VCO was back in the circuit.

Just what this receiver will look like, what it will sell for, **IF** it gets to market is now anyone's guess.

TCI - Telemetry Communications & Instrumentation Corp. - 411 N. Buchanan Cr., #3, Pacheco, CA 94553 (415/676-6102). TCI manufactures a small line of microwave transceivers, largely intended for amateur (ham) use. But they are video units so the firm does have some experience in the area. They began working on a super-deluxe 24 channel tuneable receiver sometime late in 1979. They brought one to SPTS '80 San Jose and it had a number of unique features that made it very appealing. For example, there is a built-in modulator with sufficient 'power' to send the TVRO signal (remodulated to a standard TV channel) through several thousand feet of low cost coaxial cable which you would string around the neighborhood or to several hundred receivers in a building. The receiver performance looked very good (no color tearing or other impairments) but the designer, a chap named Green, was reluctant to show off its insides to us. We asked him to arrange for a **CSD** lab test of the unit; he said he would work on it but no followup has occurred.The receiver is in the $1800 list price range

[The] WASHBURN RECEIVER - P. O. Box 636, Fairport, New York 14450 (716/223-7457). If you have been reading straight through to this point (as we have been writing) you probably are wondering how this industry ever got so far as it has gotten...when so many pieces of equipment (and the firms behind them) seem to be plagued with problems either of their own making or bigger than they are. Here's another one. Clyde Washburn was employed for many years by a high class big buck microwave technology firm. He built up his own receiver starting first with the famous Taylor Howard Manual plans. Clyde decided he could make the receiver better, had access to several hundred thousand dollars of test equipment, and also had the credentials to pull it off. The Washburn Receiver was born and STT prepared and sold an extensive manual on this receiver starting in February of 1980. Alas there were problems. Washburn is one of those guys who is a stickler for everything being current and up to date. In a fast moving electronics field where every week brings new changes, innovations and parts, Washburn elected to try to keep his receiver up to date with the latest parts that were coming out. **CSD** decided to try to keep up with his changes and month after month we published 'errata' sheets in the Digest; changes and corrections and mostly updates. Like any real engineer each new part that came out was carefully scrutinized to see if it would make the receiver work better. If it did, Clyde made a modification. Pretty soon the modifications were in danger of being longer than the original manual. This caused Clyde's agreement with John Ramsey of Ramsey Electronics to get lodged in a crack since Ramsey found he could not keep up with Clyde's rapid fire changes. Pretty soon Ramsey and Washburn had a parting of the ways and Washburn went about looking for someone else to produce his receiver.

Washburn made very specific engineering claims for his unit. It would produce better color and it would be more sensitive than any other receiver on the market. After a disaster (it didn't work at all) at the Miami SPTS he came back to the San Jose SPTS and did a good job of convincing us he was close to being on the mark with his claims.

All of this is superfluous however if the receiver never gets built in quantity and never gets into the field in working order. He now **seems** to have the backing to make this happen, he has reduced the list price from nearly $3,000 to under $2,000 and he has approached the marketing program with an eye to signing up as dealers anyone who shows the proper credentials. He has also decided to allow dealer discounts in pricing without much regard to the quantity purchased.

ALAS - proof of the pudding is still ahead.

SUMMARY

This whole thing may seem like a 'toy industry'; that is, one more fiction than real, one not grown up enough to be serious about itself or a serious 'threat' to anyone. In many ways this is true...it is a very young and a very dynamic industry.

The industry has grown from nothing of any kind barely one year ago to what may be approaching $10,000,000 per annum in the current 12 month cycle. It has done so with virtually no input from any established firms with big dollars to invest and it has done so under all sorts of dark clouds regarding the legality of what it does or what those who buy its products do with those products.

On the other hand if this was a mature or even grown up industry the opportunities for business development and the opportunity to 'get in on the ground floor' of what potentially may turn out to be a huge marketplace would not be here; it would already be history.

This is no industry for people who want every T crossed or I dotted. That will all come with time and when it does much of the present opportunity to invest, grow and 'make a killing' will also be gone. Investment dollars placed into this industry today are 'dollars at risk'. But - they also are dollars offering a high potential for return. If security for your invesment dollars is what you are looking for - put them in CDs. If the potential for big returns is more your style, this is where the action is!

ADDENDUM "A"

PRIVATE MARKETING TERMINALS IN 1980

CREATING EXCITEMENT

Selling satellite television is a very exciting endeavor. The mere concept of tuning in extraordinary television from 'space' captures the imagination and fancy of virtually every person exposed to it. The business is also filled with pitfalls and bottomless pits so deep that one careless trek can leave the neophyte dealer crippled for life and out of business before he ever gets started.

During Houston's SBOC '80 Bob Cooper is bringing out a new STT manual entitled "Coop's Satellite Business Opportunities Manual". Digging into files of successful and not so successful efforts to sell private (and low-grade commercial) terminals Coop is putting together a game plan to assist would be entrepreneurs in this new field in avoiding both the big pits and the little pitfalls which everywhere dot the countryside.

Perhaps the greatest danger in selling satellite TV hardware or systems is your own enthusiasm. Unless you have come into this industry gradually, from an allied field such as cable television where there is a deep appreciation for the sanctity of ownership rights of various types of television programming, the usual human response to satellite TV signals is that 'Hey - they are there,they are available for the taking'. Sadly that is not true. And if a dealer takes it upon himself to push home satellite terminals with a sales pitch that builds upon that premise, he is digging his own pits. And as many previous feature reports in **CSD** have detailed on a regular basis, we all must be extremely careful with not only **how** we represent the services available but what premises (as well as promises) we create to sell the hardware systems.

Most of the marketing efforts to date have been exploratory in nature. That is, people or firms have chosen a particular operating style to project as an image for their own particular selection of hardware. We'll look at some of these here. But not before the inevitable history lesson.

THE FIRST...

The first serious, well funded, carefully researched effort to sell private terminals was fielded by Scientific Atlanta in the spring of 1979. SA was a natural for this effort since they had been the first serious marketeer of commercial terminals for the commercial folks; in particular, cable TV systems. SA at the time was clicking along with sales in the $100 million per year range, growing like a weed, and according to detailed analysis within the cable industry selling around 65% of all of the cable TV satellite terminals being bought. SA was clearly number one in a field of perhaps ten suppliers.

In March of 1979 an SA chap named Dick Campbell got in touch with Coop and shared his thoughts on the development of a 'home terminal division' at SA. The new division would be called HOMESAT and Campbell was expected to head it up. Typical of SA approaches, HOMESAT would be a marketing operation drawing upon the manufacturing capabilities of the parent firm. At the same SA was producing 4.5 meter and larger dishes, a tuneable plus a fixed tuned (single channel) TVRO receiver, was about to introduce what for the cable industry was a low cost video modulator ($700 region) and they were up to their multi-hundred-thousand investment dollars in creating their own LNA manufacturing capabilities.

HOMESAT was carefully created and conceived to **not do** just exactly what it ended up doing. How's that? Well, SA knew well that the whole concept of **individual** private home satellite terminals was not going to be popular with the cable TV folks. The cable firms, after all, had an 'exclusive' on re-sale or local distribution of programs sent out via satellite. SA surmised, correctly, that cable firms would not like to see some other market develop which might **share** this same satellite feed service. To combat this expected response SA's Campbell created a marketing program which used the cable firms as installing dealers and maintenance centers for satellite terminals. A cable firm in Boise City, Oklahoma (for example) became the 'franchisee' for SA in an area about 100 miles in diameter. Which pointed up SA's second market thrust; they were going to zero in on the **rural market**. Campbell commissioned a detailed marketing study which when completed revealed to him that some 60,000 plus ranches and farms existed in an 11 state area. All of the 'spreads' earmarked were large enough (in annual dollar sales volume) to 'qualify' for private (home) satellite TV terminals.

Armed with this program and these statistics, Campbell chose Coop's weekly satellite delivered TV program (then being created for the cable industry) to spring the new SA approach. Within days of the program's airing the SA entry into the home satellite terminal business was the latest gossip subject for the cable folks. And there were negative responses very quickly.

DICK CAMPBELL [left] with Coop on set of 'Satellite Magazine' TV program reveals his firm's plans to enter private terminal industry; April 1979.

The first significant response in the negative came from the program suppliers; HBO in particular. Home Box Office told SA "**We don't think we will be able to authorize your private terminals to use our transmission**". SA's Campbell made an assumption that later turned out to be false; he was confident he could work this out with HBO since SA was a major supplier to HBO of terminal hardware. At that time HBO was literally giving terminals away to cable systems if the cable systems would carry the HBO pay programming and SA had cut a fine, money saving deal with HBO to supply much of this equipment.

The first SA installation, in New Mexico, fit the mold created by Campbell; a very remote ranch family, isolated on a 360,000 acre spread. No television at all. Their 4.5 meter dish and twin satellite receivers put them in touch with farm and ranch news and Bozo the Clown from WGN. Subsequent publicity on the type of installation and type of viewers was lost however when the second, third and so on 'buyers' turned out to be a totally different type of user. One was a sports nut in South Carolina who wasted no time getting national publicity because he suddenly had access to as many as 50 baseball games per week. Another was a TV addict in Ohio who found tuning in network news feeds far more fascinating than Bozo the Clown. And so it went and the pressures began to mount.

To stifle the negative responses coming from the cable folks and the networks and everyone else involved with bird transmissions, SA saw to it that their customers filed for and obtained full FCC licenses. To cover the matter of using various cable-intended program sources Campbell directed SA to take a full year's fees out of the sale price and forward same in check form to HBO, Showtime et al promptly upon installation.

Meanwhile cable giants put the screws to SA. A planned giganic sales push, aimed at getting cable firms to become dealers or maintenance centers for SA home terminals was scheduled for the annual cable TV trade show; and then cancelled at the last minute because of cable industry negative feedback. At that trade show SA Chief Operating Officer Sid Topol sought out Coop to counsel him. "**This can be the biggest thing that ever happened to either of us; but we have got to cool the publicity, back off and leave it alone for awhile while the cable industry gets used to the idea**".

Well, the cable industry did not get used to the idea. In fact, by the time of the first SPTS ('79 held in Oklahoma City) SA's Campbell and his firm's display had adopted a backed off and almost silent attitude. HBO's refusal to accept SA checks for one-year-in-advance programming had come to a head and after his scheduled first day appearance at SPTS Campbell hopped a plane to New York for what turned out to be the final showdown meeting with HBO.

SA had a lot riding on the development of private terminals. There had been significant contacts between SA and firms **such as** Radio Shack. SA's Campbell was projecting thousands of small antenna terminals (3 to 4 meters in size) per month, with the SA built LNAs and SA built receivers to back it up, by the end of 1980. Quietly, off the record, he as even talking about a planned joint venture with a firm **such as** Radio Shack whereby they were targeting a 'Christmas 1981' introduction of a **complete $1,000 terminal** (antenna, receiver, LNA...all manufactured by or for SA). One had to assume that the SA entry into LNA manufacture and the expansion of their small dish (3 meter) antenna facility was all tied to these type of projections by Campbell. "**Our first sub-target is going to be a $50 4 GHz to IF front end; by the first of 1981**" Campbell said. "**Our concept is that by marketing in sufficient quantity you can get the LNA gain required and the high frequency mixing down to a $50 cost-to-us factor if the whole package is intergrated together**".

Alas, support from a firm 'like Radio Shack' never came (if it was ever there at all) and the HBO monkey wrench became a bottomless pit that by early in the fall of 1979 had driven SA **out** of the direct home satellite terminal business. There are skeletons about and even some remnants of that marketing operation however. Foremost of these is a Denver, Colorado operation called WTCI; Western Telecommunications Incorporated. WTCI is one of those moderate size communications conglomerates that owns and operates a big string of cable TV firms along with one of the nation's largest, privately owned common carrier microwave firms. The microwave group supplies TV channels to cable firms in most of the states west of and inside of the Rockies.

WTCI and SA announced, just about one year ago, that WTCI was assuming the 'marketing role' for private (home) terminals formerly done by SA. Campbell left SA shortly after this announcement. WTCI offers today to ranchers and farmers and other people with around $3,000 in cash to put up for installation and around $150 per month to put into a programming and equipment leasing kitty a private home terminal. WTCI cut their own deal with HBO et al and they had the clout to make it stick.

Because WTCI operates a healthy and large string of cable TV systems, and because HBO depends upon firms such as WTCI to make its own business work, it was not too surprising to learn how WTCI and HBO worked out a problem which had stopped SA dead in a pit. Said WTCI "**We take a portion of the $150 per month fee and we pay each of the program suppliers viewed by the leasee's home TVRO system**". How?

Well, WTCI simply '**counts**' the home terminal viewer as if he were really **connected to** a nearby (however far that might really be) WTCI cable TV system. If the Bozeman, Montana cable system had 2,500 HBO subscribers at the end of the HBO payment month and somewhere outside of Bozeman there were four private terminals also getting HBO through WTCI installed private terminals, the reported count for Bozeman simply became 2504.

WTCI also claimed to have solved the 'other' problem which SA could not solve; control over programming if the customer did not pay. "**If a leasee refuses to pay for his terminal, we take it out. Nobody ever gets behind in payments to us and we never get behind in payments to HBO that way**" notes WTCI.

The concept was clever but not novel. A speaker at the first SPTS proposed that everyone in attendance sign up to his 'Satellite TV Cable Service". He suggested that he would contract with HBO for the sum of all of the individual home terminal users he represented and everyone would be 'happy'. Unfortunately HBO said 'no dice'; they were not going to authorize any such 'cable company' to use their programs unless the operator had some foolproof way to 'shut off' viewers who refused to pay.

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SA's HOMESAT division initially created advertising theme built around the attractiveness of the satellite programming service.

The same problem bothered SA's Campbell from the beginning. '**What happens if**, after the first year, your New Mexico rancher decides he doesn't want to pay HBO (or anyone else) for the second year's service" we asked him. "**He would get cut off**" was Campbell's response. We wondered how. On Coop's TV program Campbell squirmed in his seat and responded "**We have proprietary ways**". Short of building into each TVRO receiver a one-year self destruct fuse we didn't see how. Off camera he added "**I wish you hadn't asked me that!**". Clearly WTCI had found the only sensible answer that would satisfy HBO; retain ownership of the terminal, **and lease** the terminal plus the service to the user.

The WTCI program has not exactly lived up to Campbell's projections. With the end of the first year approaching perhaps 75 such terminals will have been installed. Several non-'professional' dealers have done better with much less fanfare.

Perhaps the most distressing factor in all of this has been the unwillingness of the program suppliers to deal with non-cable terminals. It is a complex problem with no obvious easy answer.

HBO and Showtime maintain, in public and in private, that their own agreements with the movie suppliers have specific limitations written in which prohibit them from accepting contracts or providing service from or to non-cable (or more recently, non-motel/hotel) 'clients'. Such contract prohibitions may **well** exist but there is at least the presumption that more is involved. For example, 'The Movie Channel' **has accepted** private terminal viewers from the beginning; at a $96 per year fee. Not many have signed up but while HBO and Showtime, through then-SA's Campbell, were telling delegates at SPTS '79 in Oklahoma that they would **not** allow private terminal viewers Warner's then-Al Parinello was speaking on the rostrum of SPTS telling the **same delegates** that Warner **would accept** private viewers. Since by in large Warner buys movies from the same suppliers as HBO and Showtime, one wondered how Warner could offer the service to private terminals while HBO and Showtime could not.

Perhaps the fact that HBO and Showtime were at that time aggressively selling **their services** to the cable market while Warner's service was primarily being utilized by Warner-owned cable systems had something to do with it. Warner was **not** fearful that cable operators would give them hell for the move but HBO and Showtime were. HBO in particular was extremely sensitive about its position in the market and as evidenced by the pressures they placed on SA was not going to create any situation which might endanger their leadership position as a pay programmer.

MEANWHILE...

Well, if big bucks and big corporate muscle couldn't pull off a viable marketing program for private, home terminals, what chance did a small firm with no bucks and no muscle have to make it work? Surprisingly perhaps, smaller firms had a much better chance of getting started and surviving **simply because they were small**. A few got off the ground peddling a half dozen or so terminals per month in the fall of 1979. They did so by identifying who their market was and then concentrating on **that** market.

Chuck Colby at **Microwave General** did more in this area than perhaps others. Starting with a ten foot terminal antenna, the usual assortment of LNAs and one each of the various receivers then available Colby decided to capitalize on his special knowledge of the California electronics industry. First came a major public demonstration of low-cost satellite TV terminal operation, conducted during the 1979 WESCON electronics show in San Francisco (see front cover, **CSD** for January 1980). Colby knew that in the hundreds of California based electronic firms there were many dozens of well heeled executives and stock holders who had the bucks to acquire a terminal. He also reasoned that with some knowledge of electronics such people would not be difficult to 'sell'; that they would grasp and appreciate the concept. Sales went well and Colby was a quick learner. One of the most important things he learned was that people in California don't like big dish antennas as focal points for their yards. Armed with this sales resistance he set out to design an antenna mount for antennas up to 16 feet in size which would have all of the desireable characteristics. Namely, exceedingly **low profile**, **automated** azimuth and elevation tracking and a **digital** display system handsomely mounted for wall hanging which would tell the user exactly where the dish was pointing at any time. He did one more thing; he went to 'outdoor-blend' colors for his dishes with tans and golds and subdued greens commonly employed. A sales presentation notebook fitted out with large, professionally created photos showing the antennas carefully set back into rose gardens, adjacent to hedges and wherever else they have been installed goes a long ways to dispell potential buyer fears that they will end up with a 15 foot glaring white bird bath outside their living room window. "**Not everyone believes a satellite dish is a thing of beauty**" comments Colby.

Colby was one of the first TVRO dealers to outfit a trailer with a portable antenna. "I began with a ten foot on a trailer under the theory that while most of my California installations would not be 10 foot antennas the small dish could be an effective demonstrator of the service". Colby found that the ten footer became a demonstrator of the 'novelty of satellite reception'; not the potential 'quality' or 'diversity' of the service. "There is an important difference here" he notes. "You can attract a big crowd in a shopping center with a 'satellite TV - **the novelty**'. But you don't attract many **buyers** of high grade, high-dollar systems." He then graduated to a 16

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50 dB of gain (minimum), **85 degrees K** (maximum) across the full 3.7 to 4.2 GHz range. A major brand LNA with credentials you have to see to believe. And at a price more than 50% below previous 85° units. **The ultimate LNA; priced at just $1995!** Call for full details.

AB Electronics (305-887-3203)
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Now available at an affordable price...

PARABOLIC REFLECTOR ANTENNA

Big 10 ft. diameter fiberglass construction with 4 petals and center section. Bolts together easily in 45 minutes. Focal length 48.6, F/D Ratio .4, Gain 39db. Weight 185 lbs.
Reflector only $680.00.
In lots of 10 $585.00.

MINI - CASAT
RT. 3, BOX 160 FULTON, MS 38843
601 862-2132

foot trailer rig which simulates for potential buyers the **same reception** they would have with a permanent 16 foot installation. "It all has to do with properly **qualifying** your buying candidates".

Many early dealers fall into this trap. Shucks...there is no trick to attracting a **crowd** of people with a **free** show. And you may actually enjoy explaining what it is and how it works everytime somebody asks a question. At least for the first dozen or so times you do it. But then after a day or two of this you slowly realize that you must have talked with dozens or hundreds of people and yet you don't really have a single **solid** sales lead. "Everyone **wants** one...but I haven't **sold any** yet" is a common early pitfall. Colby believes the successful dealer doesn't limit his marketing to public displays and the development of sales leads from such displays. "It has been my success that you **pre-qualify** your market and build your own list of potential buyers. Approach them with the message having first determined that they are the type of people who fit the mold of likely prospects and that they **can afford** the system".

Affording the system is a key element in all of this. SA's Campbell did a rough form of qualifying when he engaged a market research firm to determine how many farms and ranches there were with sufficient annual gross income to allow them to afford such a terminal. Others, such as Colby, do the same thing on a smaller scale.

"Upbeat, alive people who are successful in business and who have as evidenced by their life styles surplus descretionary income to spend are the best prospects. If a family fits this general mold then you can zero in on people with special interests such as sports or movies or insatiable appetites for current events (news)".

The trick then is to combine both public displays, which creates an image for you **and** your firm, with a carefully researched list of key prospects. "**Once the prospect list is started** you begin to look for ways to get an introduction to people **on that list**".

Marching up to someone's door after you have done your own investigation and qualification and asking "**Would you like to** buy **a satellite TV terminal?**" is probably not very effective. Dealers with a track record in this area prefer to bring out the prospect's interest in specific areas such as sports and then gently slide into the unusual sports coverage available on satellite. From this point in the contact it is a short side trip to hauling a trailer mounted rig to the prospect's site for a day or two of actual demonstration.

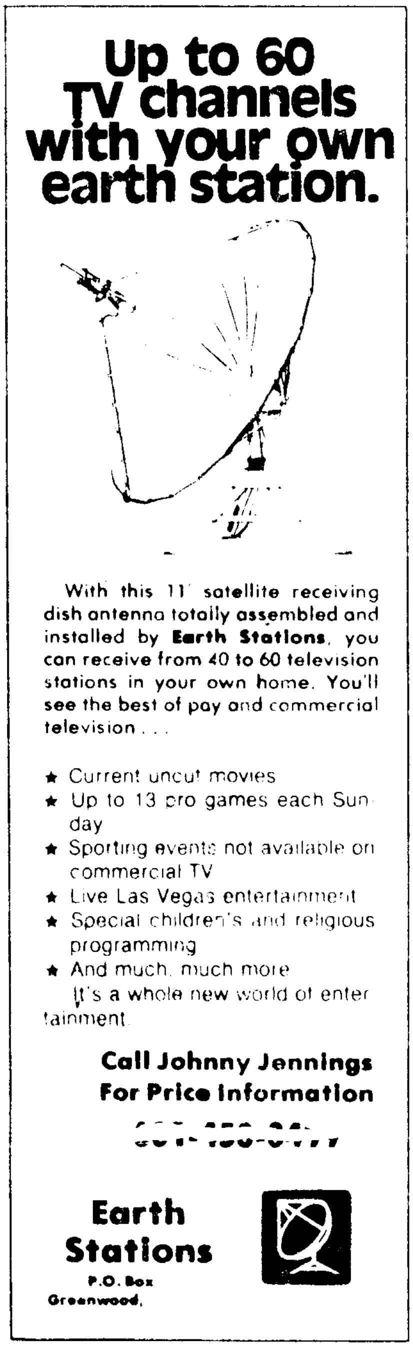
AWESOME...

An appreciation of the basic difference between 'the novelty' of satellite TV and finding 'qualified' potential buyers is important. Much of the advertising created to date has perhaps over emphasizes the 'novelty' factor. "**Up to 60 TV channels with your own earth station**" headlines one advertisement prepared for insertion in national publications **TV GUIDE** and **PLAYBOY**. "Exciting New Viewing Worlds" headlines another advertisement with the sub-headof "Directly from space satellites to your own earth terminal". Still another reads "Television Programming Relayed by Satellite".

A full page layout prepared by SA said it with a certain eloquence. "**Spage Age Television for your home via satellite...**". When SA abonded the direct sale of home terminals Campbell had been exploring utilizing the same agency that creates the Coca Cola advertising themes. If 'Coke Adds Life'...what would satellite reception add!

Overselling the product is very easy. The service is awesome and mind boggling. It is easy to get caught up in the massiveness of the offering and in the process both overwhelm the prospect and create for yourself some potential legal problems. It is the latter which begs attention.

"**Up to 13 pro games each Sunday**" suggests one advertisement. Now you and I both know that the only way you can dial in 13 pro football games on a Sunday is to 'drop in on' the **network** feeds on WESTAR, COMSTAR and SATCOM FII. You and I also know that the networks and the FCC take a very dim view of such viewing since these are not relaly telecasts but rather they are private links between a program origination site and network control headquarters. Inserting into advertising this line openly taunts the FCC, the networks and perhaps worst of all, the professional football folks. **It is a good way to end up in court.**



Up to 60 TV channels with your own earth station.

With this 11' satellite receiving dish antenna totally assembled and installed by **Earth Stations**, you can receive from 40 to 60 television stations in your own home. You'll see the best of pay and commercial television . . .

- ★ Current uncut movies
- ★ Up to 13 pro games each Sunday
- ★ Sporting events not available on commercial TV
- ★ Live Las Vegas entertainment
- ★ Special children's and religious programming
- ★ And much, much more

It's a whole new world of entertainment

Call Johnny Jennings For Price Information

[illegible]

Earth Stations
P.O. Box
Greenwood,

PUSHING ON number of TV channels available by satellite, this advertisement was prepared for a schedule in TV GUIDE.

Another brochure makes a similar slip. "Our home Earth Terminal Satellite System is what you need to give you a broad spectrum of the various shows transmitted via satellite. **Home Box Office, Showtime**...and an unlimited selection of sporting events are just a few examples...". Use of the **specific** programming service names, in particular HBO and Showtime, is a no-no. It would be far better and safer to highlight the 24 hour service offering of 'The Movie Channel' although naturally people on the street may not identify with that name as readily as with the near-generic term 'HBO'.

COMPLICATED...

Many of the early brochures and to some extent current brochures forget that the typical prime customer candidate is **not** interested in LNAs, receivers or antennas. They will be purchasing the final result only; the pictures and the sounds. And the only part of the system they will deal with on a regular basis is the control portion of the package. Colby believes this part should be handsome, well appointed, and easy to use. "**It only costs $30 to $50 more to put the control switches into a good looking walnut or other fine wood case**" notes Colby. "When you are dealing with a terminal that sells for upwards of $10,000, it makes no sense to stick switches into a Bud box that offends the family's decorating values".

One Tulsa, Oklahoma dealer created his own design for an electronics system to readout the exact antenna location and is working on an even simpler system which will do away with digital displays of azimuth and elevation in favor of a simple symbol system. As the polar mounted antenna scans across the sky the display panel will light up with a satellite symbol as each bird location is reached. When the antenna is 'on the money' a separate portion of the display will flash 'WESTAR III' or whatever is the appropriate satellite on boresight. "We noticed early on that it was a mistake to tell people how low noise their amplifier would be, that their receiver was double conversion or their antenna had a special scalar loaded feed horn. We have even eliminated any technical language from our brochure since we believe this turns people off; they don't like complicated facts although they may be very awed and even impressed with the complicated system they are installing".

Holding back the technical details of the system is another way of holding up the system pricing. "The more detail you give the customer, the more apt he is to think he is rapidly becoming an expert. Pretty soon you have a know-it-all telling you your LNA is wrong or your feed needs to move to the left. I prefer to tell the customer to go away, after we decide exactly where the system is going, and not come back until we get it installed and operating" notes one Ohio dealer.

TVRO SYSTEMS

SYSTEM I - Prodelin 15' Antenna — Microwave Assoc. VR-4X Receiver. Two Avantek 4215 LNA's. Video Tape Recorder Modulator. Cables.
Dealer Cost $13,950.00

SYSTEM II - Prodelin 12' Antenna — remaining equipment same as System I.
Dealer Cost $12,700.00

SYSTEM III - Prodelin 10' Antenna — remaining equipment same as System I.
Dealer Cost $9,990.00

SYSTEM IV - Microwave Assoc. VR-3XT Receiver. Prodelin 10' Antenna. one Avantek 4215 LNA. Modulator. Cables.
Dealer Cost $6,995.00

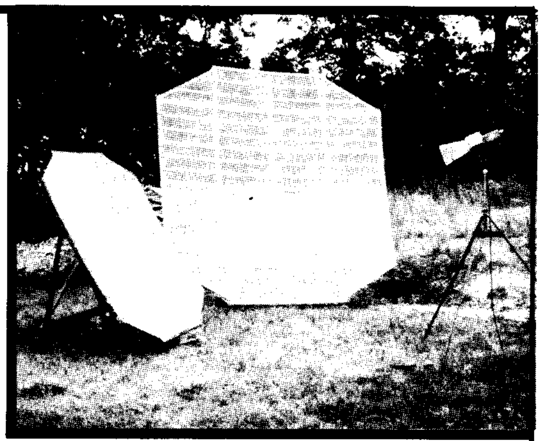
SYSTEM V - SAT-TEC R-1 Receiver. Prodelin 10' Antenna. one Avantek 4215 LNA. Modulator. Cables.
Dealer Cost $4,995.00

Prices net and do not include freight or tax if applicable.
— write or call for catalog —

DELSTAR
SYSTEMS

Distributors of Earth Satellite Systems Equipment
7800 Bissonnet, Suite 200 Houston Tx. 77074
713/776-0542

THE UNBEATABLE PAIR!



BY NOW virtually everyone knows you have at least two good choices when selecting your satellite TV antenna. The parabolic dish, and, the Spherical. And most people now know that the Spherical offers advantages no parabolic can offer. Such as multiple-satellite visibility, far lower wind resistance (the winds blow through the surface), and not insignificantly lower cost.

THE 8-BALL is the leading antenna line in the Spherical field. Hundreds of 8-Ball antennas are now providing high quality reception from Canada's frozen north deep into Mexico and the Caribbean. Our popular 12 foot size is now joined by a new 8 foot 'demonstrator special' which extensive testing reveals will perform as well as or better than any 10 foot parabolic on the market today! PLUS - with an 8 foot trailer mounted you can demonstrate the length of the full satellite belt (over any 30 degree span) right at your customer's location by simply moving the feed antenna from bird to bird; leaving the Spherical reflector surface 'in place'. BOTH the 8 foot 8-Ball and the 12 foot 8-Ball are now available in the standard mesh and a new 'tough mesh' for extra rugged applications. Pricing remains $750 for the standard 12', $780 for the ruggedized version while the new 8 foot is priced at $650 for the standard mesh and $685 for the ruggedized version.

SHOPPING FOR THE BEST LNA BUYS? Check with 8-Ball **before** you order because we'll give you a price on brand-new factory sealed Avantek 120 degree (50 dB gain) LNAs with the DC power block that will knock your eyes out!

VIDIARK ELECTRONICS DEVELOPMENT CO. Phone 501-895-3167 P. O. Box 57, Salem, Ark. 72576

POSITIVE...

Perhaps the best brochure simply states the 'type' of programming services available, and awesome quantity of such programming ("Over 200 hours of movies per day!") and then selects several key sales points to soften the blow of the system pricing. One of the most effective techniques here is to compare the price of your terminal to some other regular family purchase. New car pricing offers many opportunities for 'A' and 'B' pricing comparisons. Swimming pools, popular purchases for people with that kind of money to spend, is another with the notation that unlike the typical pool the satellite TV terminal can be used by young and old alike 365 days a year regardless of weather!

Shared terminals is an appealing sales approach ("Neighbors may share if they agree to watch the same programs you have selected..." reads one brochure) but it must be handled carefully. The primary sales advantage to shared service is obvious; pricing can also be split between groups or families. But conditioning sharing on **everyone agreeing** to watch the **same programs** at the **same time** may be a mistake. Some dealers report they have clearly spelled out sharing options in their sales manuals. The first option they offer calls for one antenna and LNA to be shared but each home has its own receiver. Using the new remote control packages (such as the ICM TV-4300) the receiver for each home can actually be located at the antenna site with inexpensive three wire remote control cables stretching hundreds or indeed thousands of feet going back to the terminal while a piece of RG-59 carries modulated RF back the opposite way to the homes. "We have found the best combintion occurs when neighbors agree to share a common antenna/LNA system" notes one dealer. Another notes that his experience with shared terminals has been only 'so-so' and that two such installations eventually ended up with each home having separate antennas after a few months of 'shared service'.

FINANCING...

Getting financing on home terminals is difficult. **Charles Dascal**, Chairman of the Board of Miami's Continental National Bank tells us why.

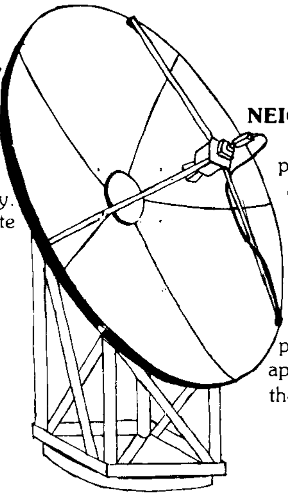
"I have my own private terminal and I love it. But **I would not loan money** on a terminal at this stage of the development". Why? "Terminal prices are much too fluid and technology is developing far too fast to look at a satellite terminal the way we look at new car loans for example. We

TELEVISION PROGRAMMING RELAYED BY SATELLITE

A COMPLETE SATELLITE STATION FOR YOUR HOME

IF poor reception or limited selections of local television stations limit your viewing, then satellite television is for you. Our home Earth Terminal Satellite System is what you need to give you the broad spectrum of the various shows transmitted via satellite. **HOME BOX OFFICE, SHOWTIME, NICKELODEON,** and an unlimited selection of **SPORTING EVENTS** are just a few examples of the programs that are available to you at home.

AS A RECEIVING SYSTEM, the Home Earth Terminal Satellite System gives to you studio quality pictures in your home. A clear view of the southern sky, free from obstruction is all that is necessary. The dish must "see" the satellite 22,300 miles above the equator.



NEIGHBORS MAY SHARE if they agree to watch the programs you have selected. This limited form of sharing requires little more than the cost of the cable. Additional equipment is necessary if they wish to select their own programs. The cost will be approximately 65% above the usual installation cost.

CONDOMINIUMS, APARTMENTS, MOTELS, & RESORTS will offer a special attraction when they own a system designed especially for them.

NO LICENSE is necessary: On March 23, 1979, the U.S. Department of Justice, in a filing before the FCC, took the position that "existing laws do not require FCC license to use a device that simply receives radio communications."

SAFETY: Microwave signals from satellites are all around us. This equipment is merely a receiving device. All outdoor electrical wiring is a low DC voltage drawing less than 10 watts.

FINANCING CAN BE ARRANGED

COVERING THE BASES - this brochure was prepared to highlight the options available to the terminal owner. Use of generic terms such as HBO and Showtime could lead to legal problems however.

have a long history of new car loans and we know precisely what a new car will be worth days, months and years after it is driven off the dealer floor. We have no such history on satellite terminals and with prices dropping so fast I could not loan money on a terminal using the terminal as collateral".

What Dascal is saying is that a $10,000 terminal cannot be considered the same as a $10,000 car. A twenty percent downpayment on a car is far more than adequate but a much larger downpayment would be required on a terminal simply because the bank doesn't want to have to dispose of a partially paid for terminal months after it is installed because the buyer found out he could buy an equivalent terminal some months later for half the price.

Microwave General's Chuck Colby saw this problem initially. "The people we sell to may not always have the spare cash round but they can use their other assets to round it up. To make sure that our terminals don't get caught in the downward spiral crunch of cheap terminals, we make them unique and different; from the antenna bases and subdued colors to the packaging of the control system." Colby's approach is not dissimilar to taking the high road with autos; you build in and sell customers on the **extra value** of **your particular system**. By keeping your system non-standard, you have another handle on keeping customers happy after the sale. "I anticipate my buyers will be aware of price drops and developments in this field" notes Colby "but I also know that the chances they will find the same features in an off-the-shelf package as we offer in our customized packages is very small".

SUMMARY...

Satellite marketing is growing up. Two distinct markets exists with many sub-markets. The direct sale market, represented by the **CSD** reader who is installing or building his **own** terminal, is a semi-technical market. It is largely mail-order and this is the segment of the market which has attracted most of the attention to date. It is also the market segment which has caused receiver prices to drop and hardware to simplify.

The other portion of the market has attracted less attention and may be developing more slowly. High or near-professional grade terminals, packaged by their sellers to reflect the desires of the buyers are being sold in local areas by competent, far-sighted dealers who recognize that you don't have to sell many $10,000 and up terminals per month to have a nice business going. But the dangers in selling higher grade terminals are there; the danger that you will, as a seller oversell your product, or worse yet cheapen the product so that it loses its value too quickly. We all have a lot to learn.

VIA CABLE - Your One-Stop Source For Complete TVRO Dealer Packages!

QUALITY home terminal packaging begins with the selection of high quality component parts. The TEXSAT Division of Via Cable brings to the home terminal world the experience of nearly five years in supplying high quality, cost-effective terminals to the cable television industry.

NO TWO home terminals are alike. That's why our TEXSAT Division stocks in depth a full line of 3, 4 and 5 meter fiberglas dishes including mounts, rotating feed systems and for the super sophisticated system dual-button hook feeds with orthocoupler. AND we also stock in depth a full line of the best components and hardware in the field today; devices and units field proven through years of satisfactory use by cable television systems coast-to-coast. FOR example - TEXSAT carries 120 degree Avantek LNAs, Microdyne 24 channel tuneable receivers (and there is no finer receiver available in the world today!), Blonder Tongue professional grade modulators, Heliax® and 214 cable sets and connectors. AND we also stock handsome customized cabinets for all of the inside equipment to give the ultimate user a system that not only works to state-of-the-art but is pleasing to look at as well!

AS A DEALER you need to ask us about our TEXSAT Package VIII - a special dealer package that includes a 3 meter dish with rotating feed mounted on a single axis trailer, a 120 degree Avantek LNA, a Microdyne 24 channel receiver and 100 feet of cable!

IF low-grade home terminal equipment is eating up you profits as a dealer, or if you simply want the back-up of a trained, professional staff that has been installing terminals for over five years, check us out. We've got the equipment and experience to make you profitable!

VIA CABLE INCORPORATED

P. O. Box 552
Ingram, Texas
78025
512-367-5714

ADDENDUM "B"

TVRO RECEIVER UPDATE

GOOD AND BAD

Last year about this time there was no difficulty determining what type of TVRO receiver you might have in your home or sell to your customers; virtually the **only** receivers being shipped were coming from the 'commercial' manufacturers and Microdyne was a clear leader in the **home** terminal field. The AVCOM 'home receiver' and the ICM 4200 'home reciever' first seen at SPTS '79 were just starting to trickle out the door and while you might favor the lower price of the ICM 4200 or the one-on-one attitude of dealing with AVCOM, if you needed a receiver in a hurry, you went into the commercial marketplace. Well, all of that has changed. But not suddenly and not without some way-stops along the way.

By the time spring had sprung there were other choices available to the buyer or retailer. Several additional 'new' private terminal receivers were on the market and while delivery had not become 'off-the-shelf' by any means at least product was being delivered by ICM and AVCOM with Ramsey and others starting to trickle units out the door. Which brought us to San Jose and SPTS '80 where several new receivers appeared on display and the established ICM and AVCOM receiver lines underwent some surgery. AVCOM decided to add remote tuning capabilities to their radio and ICM was determined not to allow John Ramsey to undercut them in the marketplace with a $995 receiver. As readers are aware, not everyone likes the performance of the $995 breed radios. We heard numerous people **say** that the ICM 4200 radio (the original International unit) was far better than the new 4300 and in spite of our approval of the Sat-tec R2 receiver there have been many people who found it also lacking. Past months have dealt with the R2 problems as we uncovered them.

Receiver buyers are understandably confused. Is, for example, the $995 radio just 'too cheap' to be satisfactory or is there more to it than that? We have spent the past sixty days trying to determine just where the truth really is since we as an industry have a lot riding on the success or failure of these low-end priced units. This is **our report** on where **we think** the receiver folks are today with their product and their manufacturing capabilities.

At the risk of belaboring the subject, virtually all of the high-dollar commercial radios convert the satellite TV energy into picture (and sound) with a device called a discriminator. People with a technical background know the discriminator is a broad term for an FM 'detector'; simply a system of extracting modulation (picture and/or sound) from a carrier. A 'discriminator' is typically a 'passive' device; a system of tuned circuits designed to detect the modulation. There are dozens of discriminator circuits about; some are not suitable for video, and of those that are, most have been refined by the commercial high-dollar receiver suppliers to produce exceedingly high quality color. But a discriminator is not a very **sensitive** detector circuit; at least not when modified for 'wideband' video. Which brings us to the PLL circuit.

English TVRO experimenter Steve Birkill was apparently the first to determine that you could design a more sensitive 'detector' with an **active** device called a phase locked loop (PLL). For **his** applications, tied to an 8 foot dish in England and watching (after a fashion) 22-26 dBw EIRP contour signals from INTELSAT, the PLL had several advantages. Birkill worked out a technique for compressing the bandwidth of the PLL detection system; a method of bringing at least watchable **black and white** pictures off of his 8 foot dish when the best commercial receivers wouldn't give you even a hint that video was present. Other US experimenters, noteably Taylor Howard, determined that with some more playing about the PLL could recover color reasonably well provided you hit it with enough signal. But the best PLL detector would never, it was felt, produce **superb** quality color; such as that one sees with a Microwave Associates or Microdyne receiver.

So there was a trade; a PLL was more sensitive but it also produced a lower quality picture. How can that be? Well, if the signal is weak (below what is called 'FM threshold') the PLL is **the receiver** to have tied to the antenna and LNA. PLL pictures will **look** better, with **weak** level signals, than conventional discriminators. Then along came Clyde Washburn and his Washburn receiver which rattled some cages. Washburn's receiver made claims that it was 'a sensitive PLL receiver with the **high quality color** of a conventional discriminator'. Many engineers thought Clyde was inhaling funny tobacco smoke and dismissed his statements. When Washburn failed thorugh his distributor to deliver kits and parts and modules through the spring and summer (a problem **now** rectified) the importance of his work was lost in the rush of other new receiver technology. However, it later turned out that Washburn was right. A few talented receiver builders, noteably Lynn Hurd of Beaverton, Oregon for example, found the Washburn PLL detector system did everything Clyde claimed and perhaps more. At SPTS '80 in San Jose Washburn's receiver demonstrated just how good PLL color could be although his then-inability to deliver probably overshadowed the actual performance of the unit.

Washburn's secret, if you can call it a secret (he has preached it at every opportunity and all you have to do to learn from him is to listen), was extreme care and patience with the construction, alignment and test of each unit. Hurd found that if you work carefully with the system it is capable of producing true broadcast quality color when all other detector schemes are producing noise, torn and ragged edges on sharply defined colors, and black (or white or both) sets of sparklies.

While Washburn was having a painful summer, John Ramsey at Sat-tec and Royden Freeland at ICM were having their own problems. Ramsey's early R2 receivers had a certain amount of the PLL color sharpness plague and people either loved or hated them. There were some little problems as well; in shipping, when roughly handled, the power transformer had a tendency to rip off the circuit board. If it got **loose** inside the receiver it could tear out several important circuits while rattling around. Some users reported heat problems and others said the pictures just didn't **look** good. On the opposite side of the coin those who got 'good units' loved them, carried them around without ill effects and were delighted with the compact size and reasonably good performance.

Royden Freeland was having similar problems. The $1995 price on the 4200 receiver satisfied a market demand through the winter and spring. This receiver was conceived and designed by H. Paul Shuch (Microcomm) and it followed Paul's 'modular' approach. Royden likes the modular approach feeling that it is far easier to upgrade or even manufacture a receiver in modular-pieces than it is to build everything on **one** circuit board as Ramsey does with the R2. But the new 4300, priced at $995, introduced at San Jose's SPTS was a rather large jump for ICM. The market was expanding and where 4200's went together in 25 and 50 lot groups the 4300 was designed for 100 + lot groups. Many things internal to the receiver had to be changed from the 4200 to make larger mass production techniques in the 4300 play.

While ICM and Sat-tec were adjusting to their own new production problems along came another technique that begged attention. Like so many things in this field, it apparently started with Tay Howard and some friends. The detector (or PLL circuit) was the object of attack.

One of the inherent limiting factors in PLL performance is the frequency at which the PLL operates. They are designed to detect or demodulate video from the satellite receiver's IF (intermediate frequency range). Most receivers utilize 70 MHz as a 'standard low IF'. Why? Well, because that is the way the telephone companies built receivers at Western Electric back in the late 40's and 50's and from that day forward virtually every microwave video reaceiver manufactured has followed the 70 MHz IF format. John Ramsey didn't. The R2 receiver, for example, has a 60 MHz IF. John rationalized that if a PLL had difficulty working, sometimes, at 70 MHz, it should be easier to make operate 'down' a little; say 60 MHz. Royden Freeland stuck with the 70 MHz IF but will be quick to tell you that as you go through the receiver alignment business you can often see vast differences in performance between one demodulator 'module' and another. And these differences can be traced directly to the PLL device plugged into the board. You get a module that won't produce good quality color, you can often make a world of difference by pulling out one 564 PLL and sticking in another. In a nutshell, 'pushing' a PLL as a video demodulator to the standard 70 MHz is risky. **Lowering** the frequency at which the PLL works is one way to make it work better or at least one way to insure that more of them worked at all.

Enter now Tay Howard and his 'trick detector'. Tay decided that perhaps Steve Birkill's original **35 MHz** IF had something after all; although for channel separation reasons there was no way the American 24 channel satellite receiver could use an IF **'that low'**. Still, Birkill obviously was having better luck (or getting better performance) with his standard 564 PLL demodulators than say his American cohorts. How do you get a satellite TV IF down to say 30 to 35 MHz without really going there?

Howard did it first but John Ramsey was close behind. **You divide** the FM IF signal by two (as in cut in half) with something called ECL circuitry. Then you take the output of the divider and drive your PLL detector **at 1/2 the normal frequency**. By mid-September divide-by-two was under test at ICM and Sat-tec was already shipping it.

We saw our first working divide-by-two receiver, a Sat-tec **R2A**, only days after Ramsey got his first proto-type running. We happened to be in Oklahoma at the time and since we were scheduled to visit with Royden Freeland and pick up a 4300 receiver for test (see separate report in this **CSD**) we took Ramsey's R2A down to ICM for some side by side testing.

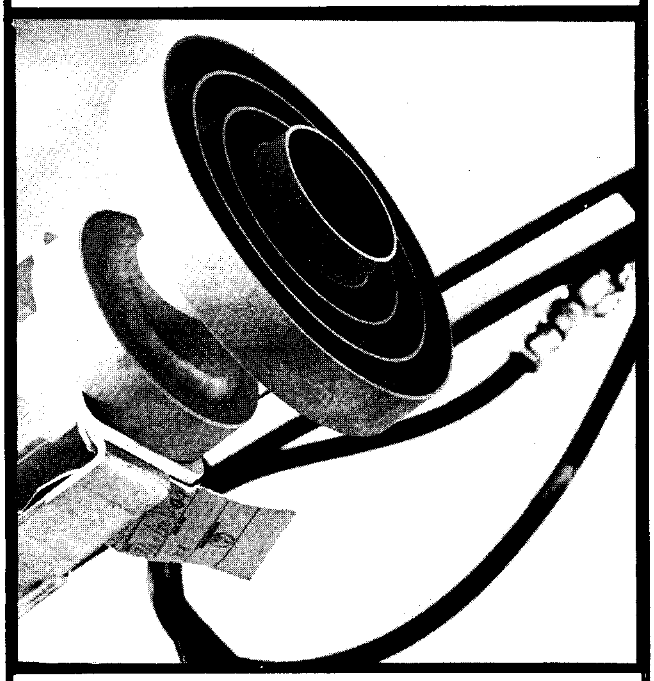
In the Sat-tec receiver the divide-by-two approach fits onto a small sub-board that tacks onto the receiver 'mother board'. Royden and I agreed the results were impressive (ICM could afford to be open with their admiration of the approach's results since Tay Howard was working with ICM on adding the same modification to the 4300 series receivers). Actual receiver **sensitivity** was either the same or slightly better. Most apparent was the lack of color tearing on sharply defined color images. Lettering, 'supered' on the screen over the top of a scene, no longer hissed and roared in the audio line nor did it 'rip' to the right with jagged trailing edges. Since this has always been one of the more objectionable 'side effects' of PLL demodulators, score one for Ramsey.

"I feel that we should offer to anyone with an R2 receiver the opportunity to upgrade their receiver to an R2A" offered John Ramsey. "Yes, the divide-by-two approach to the PLL **does make** quite a difference in the picture quality and if present owners of the R2 will return them to the factory **we will upgrade them at no charge**". Score another one for Ramsey.

While visiting at ICM we had the opportunity to view the performance on a number of TV4300 units, an older TV4200 as well as the R2A and the SATRX unit first seen in San Jose. We learned something here.

"One of our biggest problems in producing **exactly identical** TVRO receivers is the inconsistency of microwave parts" commented Royden. What happens, we wondered? "Well, there are wide variations in operating specifications within a batch of supposedly identical parts from the same supplier. And between batches...well, the differences are even larger". So here we have supposedly high tolerance parts, purchased from reputeable microwave suppliers and priced accordingly with such widely varying specifications that receiver performance also varies. We saw this as we watched the alignment procedure on receivers.

CARE
About How You
FEED
Your TVRO
Antenna!



CARE AND FEEDING of your TVRO Antenna is an oft overlooked reason why many small terminal systems have a bad case of the sparklies. The Chaparral Super Feed is the cure to this common ailment.

THE SUPER FEED gets the last fraction of a dB of gain out of your parabolic surface. It replaces horn and other non-precision feeds which because of 'illumination limitations' fail to achieve maximum 'dish gain' for your system. The increase in antenna gain with the Super Feed is well documented (for reference, see **CSD** review, July 1980) and may be as much as 1.5 dB! Super Feed bolts to your LNA (mates standard CP-229 flange) and is designed for optimized performance with dish f/D's in the .3 to .5 region.

DELIVERY is immediate from stock. Price is $135 in single lots. Call or write for more information on the Tay Howard designed Super Feed!

CHAPARRAL COMMUNICATIONS
P. O. Box 832 / Los Altos, CA 94022
(415/941-1555)

"We have standards of manufacture of course and there are bins filled with receiver modules which don't meet those standards. That's one of the reasons I like the modular approach; we test and align in segments and if a segment doesn't make the specified performance we don't use it".

Still, even if every receiver shipped meets standard performance, some meet it 'better' than others. "Yes, there are 'hot' receivers in the field right now. Some just work better than others and there is no denying that". Is this peculiar to ICM? "No, not at all; I believe you will find it with even the commercial high-dollar receivers".

Performance may even be hot in a portion of the 'band' and only par (or perhaps below) in other parts of the 'band'. We saw one 4300 on the bench that produced outstanding pictures on the lower transponders, not so hot on the high end. "After alignment and specifying all receivers are thoroughly burned in on a test stand an then checked again before shipment" Freeland added. As we talked one receiver on the bench seemed to be hotter than any we had seen in production test that afternoon. A voice spoke up. "Coop's receiver is checked out". We had brought back from the Turks and Caicos a 4300 which worked reasonably well on the high end of the band but which sometimes did not work at all below transponder 12 or so. Freeland asked how well the repaired unit worked. "Very good" was the response. "As well as that one" Freeland asked, pointing at the hot receiver we had noted on the bench? "No, not quite" was the response. "Give him the hot one" directed Freeland and within minutes I was on my way headed back to the islands with a super hot 4300 in my bag.

The 4300 was well wrapped in air-bubbles so it went into my suitcase. The R2A Ramsey had sent down was packed in some soft clothing and it went into my carry-on bag. I wouldn't let it out of my sight or hands all of the way back to Provo. Also coming back with me, slightly delayed because it went as unaccompanied baggage, was a factory re-conditioned Microdyne 1100 TVR; an early victim of the uncertain AC power line voltages in the islands.

"Remember that while no receivers leave the factory unless they meet our specifications, some **do** work better than others". Freeland's words rang in our ears as we hooked up his 4300 back on Provo. These were the finest pictures we had seen off of our 11 foot ADM dish parked on WESTAR. And although the receiver was still using a stock PLL demodulator with**out** the 'divide by two' system the color tearing was only slightly objectionable. Next we hooked up the hand packed and hand carried **R2A** receiver. After several minutes of fumbling we decided that something was grossly wrong. The pictures were noise-filled and although the color **was** outstanding we couldn't watch the video through the snow storm. OK - bring out the re-conditioned Microdyne. It worked just like it did before the local power system zapped two power supplies and we had to return it to the states for repair. Unfortunately for Microdyne, 'as well as it did before...' was obviously **worse than** the 4300 receiver. Once again the proof of the PLL system; **given a below threshold picture**, the PLL simply works **better than** conventional discriminators.

We spent the next several days, on and off when other duties allowed, poking around in the **R2A**. We had given it a several hour workout at the Lab site in Oklahoma plus used it while visiting ICM. Something had happened in transit. "There **are** shipping problems" John Ramsey had told us. "Units don't always arrive aligned as they left the factory" agreed Royden Freeland. Who's fault was it? Inadequate packing?

"No question we have to learn how to package better" suggested Ramsey. "But most of all, as long as each radio has to be hand tweeked for peak performance and the microwave parts that determine performance vary so much within their own specifications there are simply very-very tight alignment tuning ranges to work in" noted Freeland.

Faced with a minimum of two weeks of loss while the R2A would have to be 'smuggled' back into the states for repair and then eventual return we decided to try a hand at alignment of the mal-functioning receiver ourselves. The next plane for the states that could carry it wouldn't leave for two days so no time would be lost by trying.

After perhaps four hours of fiddling, during which **we did make a considerable improvement** in the picture (but still far below the performance we had seen side by side against the 4300 in Oklahoma) we buttoned it up and sent it into the stateside chain. The experience taught us that with the **R2A**, at least, **exceedingly small adjustments** on sub-miniature voltage controlling pots and slug tuned forms make fantastic differences in receiver performance. A 1/32nd turn on a form took the picture from best to gone. It was no longer any wonder to us that receivers could end up in Oshkosh not working right. In fact, it was something of a wonder that any of them ever end up where they are headed still working **at all** and that is the message you should file away.

"The experience at ICM has been that when parts are not close to their own design values, all tuning becomes critical in that area" Freeland had noted. In fact tight, erratic tuning is itself a 'red flag' that some often major component part is not operating as its manufacturer had intended. And when you marry a couple of parts into the same circuit and **both** are out of tolerance in the same 'direction' (such as both being off in a negative direction) you compound the problem.

Hummm?

Receivers are growing up. The manufacturers are learning more about them all of the time and much of what they are learning is being shared at both ends; to the users and to the chaps who supply our manufacturers with those blasted microwave parts.

There are a pair of critical microwave parts still with us. The high frequency voltage controlled oscillator (VCO) that does the tuning and conversion of the 3.7 to 4.2 GHz signal down to a high IF is one. Another is the double balanced mixer. The Sat-tec R2A has done away with the heretofore popular VARIL DBM-500 mixer; Ramsey found delivery too erratic to suit him and subsequently designed his own mixer. ICM still uses these usually high quality sub-modules.

NOW - what about those other receivers we saw at San Jose but about which we have heard very little subsequently? Let's do a quick look at each.

1)The **Taylor Howard** reaceiver designed for Canadian firm **Satellite Supplies** has undergone some major re-designing since its intended debut at San Jose. A 'test' run of 100 receivers was to have been completed during October and word was that initial marketing would be in Canada alone. You can find out more from J.R. Walsh at (604)859-6315. If you are technically motivated, you'll be surprised how much this receiver has changed from the April-June announcements from Howard.

2)The **SATRX** reaceiver introduced at San Jose had an initial production run of 20. It was first rumored to be ready for production in the Far East, then Australia. The 'truth' is this receiver was designed by a well known person **for production in the Far East** for exclusive sale **in Australia**. By some strange happenings the receiver has ended up in the US where it is apparently going to be mass produced (mass is a relative word; 50 per month to start) by another well known TVRO supplier on a job-shop basis. Meanwhile in Australia the new INTELSAT spot beam service this receiver was intended for is up and running and apparently the receiver shown in San Jose is not going to be available down under for the time being. This receiver seems to work very well but **CSD** has yet to get our hands on one for any exhaustive testing. It looks promising...but...

3)The **Washburn Receiver** has had its problems. Clyde Washburn and his original manufacturer, John Ramsey of Sat-tec, had their difficulties and 'split' officially on July 1st. Only a handful of wired and tested units got out the door prior to the problems and most of them bounced back. Clyde spent the summer putting the pieces back together and finally teamed up with a well known, national microwave firm that is riding high on the success of another consumer microwave product these days. Clyde is on the project full time and appears to have the financial and marketing backing of a good company. **But the real proof is shipment of the product.** Washburn was having his problems with parts delivery in mid-September but felt he would be shipping kits (perhaps 25 in the first batch) in mid-October and wired and tested units (perhaps 50 first month) by November. He dropped the wired and tested price to around $2,000 (earlier list near $3,000) and developed a comprehensive parts and pricing schedule. They have also decided to adopt an 'open' marketing program wherein anyone who **qualifies** as a dealer gets a dealer discount **regardless of initial quantity purchased**. You can find out more by calling Clyde Washburn at 716-223-7457.

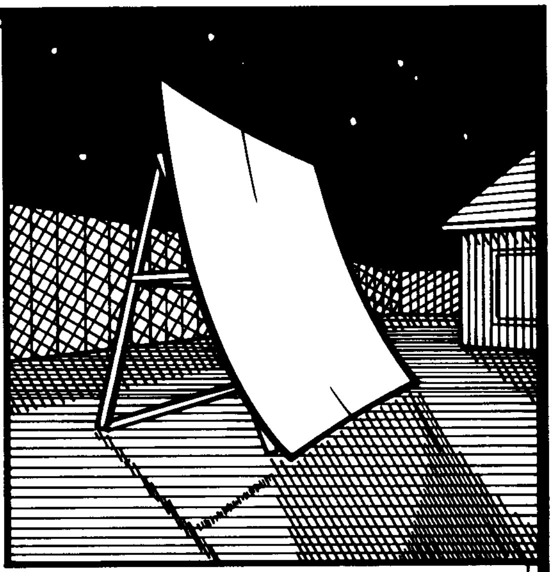
4)**John Rohner's** amazing $1500 receiver plus LNA created quite a buzz when it was first announced in May. By the San Jose SPTS Rohner was riding a crest of publicity and interest. Unfortunately his receiver was not ready to show in San Jose and by mid-September there were dozens if not hundreds of concerned folks about the country side wondering about the young man from Iowa. The last **official** word we heard was that John was tied up awaiting some aluminum castings. However several people who have managed to get through to him on the telephone subsequently advise that John's problems **may be** much more severe than not having castings. He asked **CSD** to repeat his full page, color advertisement in October with a change; **jack the price from $1500 to $2500.** With so many questions around about the true status of the receiver we declined to run the ad and our policy at the moment is to wait to see a real, live Rohner receiver in our Lab before we accept additional advertising.

5)Andy Hatfield's **AVCOM** receiver line continues to sell well and the waiting line is fairly long (typically over a month). Andy builds a quality product but for some of the aggressive retailers he builds too few of them. Andy **insists** on putting each receiver through an elaborate check out procedure and believes that he is building all he can without sacrificing quality. With so many receivers having field problems Andy may be on track.

6)**Comm-Plus** from Montreal (514-337-7255) left San Jose with very high interest in their extraordinarily beautiful receiver that frankly didn't work that well in San Jose. Their unit was adopted for a football game by the baggage handlers between Montreal and San Jose and arrived at SPTS crushed and broken. It did work but not like their builders said it should work. Unlike the American receiver suppliers, this Canadian firm started out deciding that they would not use any 'standard' microwave parts. The double balanced mixer and the SHF VCO that many suppliers wait in line to get to build TVRO receivers are of Comm-Plex design. They say this will insure that **when** the production lines get moving they will not be held up by slow microwave parts delivery. **A big splash is planned for Houston**...but again, the proof will be delivery of a reliable product. Their $1995 Canadian price is hefty but American dealers can expect a healthy discount; bigger than most US suppliers offer.

There were three other receivers shown for the first time in San Jose. The **ICON** dual-receiver attracted some interest and we understand it is doing well in Canada but delivery is not strong. The **TCI** (Telemetery Communications & Instrumentation Corp.) receiver looked good in San Jose but efforts to get one for test at **CSD** have not borne fruit to date. And the **Coleman 3742** receiver displayed by **H&R** seems to be tied up in some production and delivery problems.

Like any brand new field the firms with some strength because they have other product lines seem to be making the most noise and ultimately will have the best potential to deliver produtions **in quantity**. AVCOM is a good example of what an enterprising "small business" chap can do if he keeps his promises in line with his known abilities. Andy Hatfield has had several good offers to go 'big time' but prefers to turn out a modest number of high quality, reliable radios each month. Others **could** do the same thing but we've all been in this long enough now to recognize that 'performance' soon catches up with 'hype'. **There will be** other, new radios; from both established firms and new guys on the block. Some will make it and we'll all be pleased they did since the industry continues to need several times as much receiver product as we are getting. And that's the bottom line.



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